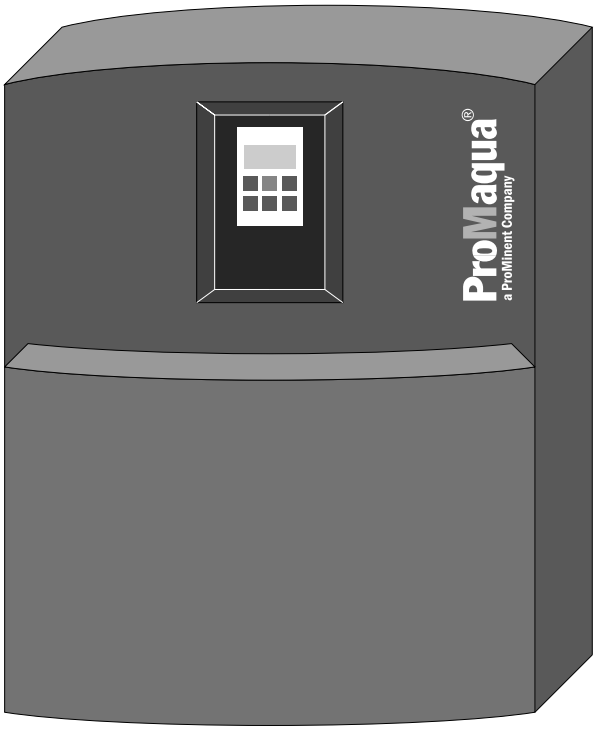
Operating instructions

Chlorine Electrolysis System

CHLORINSITU® IV compact



Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

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Table of contents

1 Device identification 5
2 About this product 6
3 Storage and transport 7
4 Safety chapter 8
5 Overview of equipment 12
6 Functional description 14
6.1 The electrochemical process 14
6.2 System 14
6.3 Operating modes 16
6.4 Options 16
6.4.1 pH correction 17
6.4.2 Integrated chlorine / pH controller 17
6.4.3 Booster pump 17
7 Requirements for the installation site 18
8 Installation 19
8.1 Installation, hydraulic 19
8.1.1 System connections 20
8.1.2 Connecting to the circulation line 20
8.1.3 Brine tank 22
8.2 Installation, electrical 22
8.2.1 Booster pump (option) 23
8.2.2 External controller (if available) 23
8.2.3 Sensors for integrated chlorine and pH controller (optional) 25
8.2.4 Flow switch of the flow valves 25
8.2.5 External enable 26
8.2.6 Brine tank 26
9 Adjustment 28
9.1 General 28
9.2 User menu 32
9.3 Menu Calibration mA 32
9.4 Menu manufacturer 34
9.5 Menu Calibrate sensor 36
9.6 Menu Setup 37
9.7 Menu Test 37
9.8 Menu Rinse 37
9.9 Menu Regenerate 37
10 Start up 38
10.1 Prepare brine 38
10.1.1 Requirements applying to the starting substances 38
10.2 Check conditions 40
10.3 Run through the SETUP menu 40
10.4 Run through the USER menu 44
10.4.1 Manual operating mode ("M") 45
10.4.2 Operating mode On / Off ("I") 46
10.4.3 Operating mode pulse signal ("F") 47
10.4.4 Operating mode analog signal 4–20 mA ("A") 48
10.4.5 Operating mode sensor ("R") 48

10.4.6 Other parameters ... 50
10.5 Check the operating parameters ... 51
10.6 Calibrate sensors ... 52
10.6.1 calibration pH ... 53
10.6.2 Chlorine calibration ... 58
10.7 Rinse water softener ... 60
11 During use ... 61
12 Maintenance ... 62
13 Troubleshooting ... 64
14 Decommissioning and disposal ... 66
15 Substances produced ... 67
16 Technical data ... 69
17 Wiring diagrams ... 71
18 Ordering Information ... 73
19 Factory settings ... 74
20 EC Declaration of Conformity ... 76
21 Index ... 77

1 Device identification

CHLORINSITU® IV compact

Device type	Part no.
CHLORINSITU® IV compact 25	1036461
CHLORINSITU® IV compact 25 with pH correction	1036462
CHLORINSITU® IV compact 50	1036463
CHLORINSITU® IV compact 50 with pH correction	1036464
CHLORINSITU® IV compact 25 with integrated chlorine and pH controller	1041405
CHLORINSITU® IV compact 25 with integrated chlorine and pH controller with pH correction	1041403
CHLORINSITU® IV compact 50 with integrated chlorine and pH controller	1041406
CHLORINSITU® IV compact 50 with integrated chlorine and pH controller with pH correction	1041404

2 About this product

Electrolysis systems of the type CHLORINSITU® IV compact produce chlorine gas by electrolysis. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included with the delivery that is then electrolysed in a membrane cell. The resulting chlorine gas and the residual brine is siphoned off through an injector integrated in the system and together with the water to be treated, forms a chlorine-containing disinfection solution.

The microprocessor controller integrated in the system digitally indicates the current output and monitors all key functions. All operating and error messages are shown in full text on the clear display. The output can be controlled manually or externally.

Electrolysis systems of the type CHLORINSITU® IV compact are especially suitable for use with smaller swimming pools in residential properties and hotels.

3 Storage and transport

Notes

The system CHLORINSITU® IV compact is packed and sent with all components on a single pallet.

The system CHLORINSITU® IV compact does not contain any chemicals or water when shipped.

Ambient conditions

Data	Value	Unit
Ambient temperature, min.	+10	°C
Ambient temperature, max.	+35	°C
Maximum air humidity *	92	% rel. humidity

* non-condensing

Miscellaneous: Protect against sunlight

Scope of supply

- Chlorine electrolysis system mounted on a wall bracket
- Salt dissolving tank
- Booster pump (option)

4 Safety chapter

Symbols used

Icon	Meaning	Explanation
	Warning	Danger to operating personnel, bystanders or third parties.
	Danger zone	Rules and regulations apply to this zone in respect of access and the devices which may be used.
	Attention	Danger of material damage to the product.
	Note / tip	Special remark

Intended use

- The chlorine electrolysis system CHLORINSITU® IV compact is only intended for the production of a chlorine-containing disinfection solution from cooking salt and its subsequent metering for the disinfection of swimming pool water.
- Any other uses or modifications to the system are prohibited!
- The system may not be operated in conditions other than those described in these operating instructions.
- The chlorine electrolysis system CHLORINSITU® IV compact should only be operated by adequately qualified personnel - see table below.
- You are obliged to observe the information contained in the operating instructions at the different phases of the system's service life.
- Please observe the relevant national regulations and guidelines at every phase of the system's service life.

Qualification of personnel

Activity	Qualification level
Storage, transport	Qualified personnel
Assembly, installation	Service
Initial commissioning	Service
Operation	Instructed personnel
Maintenance	Qualified personnel
Repairs	Service
Decommissioning, disposal	Qualified personnel
Troubleshooting	Qualified electrician or instructed person - depending on the fault

Qualified personnel

A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognise possible dangers based on his/her technical training, knowledge and experience, as well as knowledge of pertinent regulations.

Electrical technician

Electrical technicians are deemed to be people, who are able to complete work on electrical systems and recognize and avoid possible dangers independently based on their technical training and experience, as well as knowledge of pertinent standards and regulations.

Electrical technicians should be specifically trained for the working environment in which they are employed and know the relevant standards and regulations.

Electrical technicians must comply with the provisions of the applicable statutory directives on accident prevention.

Instructed person

An instructed person is someone who has completely read through and understood the operating instructions and has been briefed by service during start-up.

Service

Service refers to service technicians who have received certificated training and have been authorised by ProMaqua® or van den Heuvel to work on the system.

Safety equipment

The system has the following safety equipment:

- Reed switch for internal flow
- Motor protection switch in the terminal box
- Hydrogen exhaust duct

The maintenance manual describes how these are tested.

General safety notes

WARNING!

The liquid in the drainage system may contain sodium hydroxide solution.

Sodium hydroxide solution arising during the electrolysis process must always be discharged via a closed pipeline system into a sewerage junction or a floor drain.

When working on the drainage system after start up, take suitable safety precautions.

WARNING!

Avoid excess chlorine gas.

Only switch off the electrolysis device with the *[START/STOP]* key. It cannot be switched off via the "Output" setting and chlorine gas may continue to be produced.

WARNING!

Safely discharge any waste hydrogen produced.

Hydrogen arising during the electrolysis process must always be discharged via a closed, continuously rising, pipeline system to the outside and discharged away from dangerous areas.

Annually check the continuity of the "hydrogen disposal line".

WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

WARNING!

Danger due to hazardous substances

By operating this system the operator generates hazardous substances.

The operator is responsible for adapting the operating instructions to their system in the event that more recent knowledge about the dangers associated with a hazardous substance and its avoidance become available or national regulations prescribe something else to that stated in the supplied operating instructions.

Note for the system operator

Keywords when searching for the necessary regulations:

- Chlorination
- Explosion protection
- Potable water
- Swimming Pools
- Sodium hydroxide
- Hydrogen
- Hazardous substances
- Personal protective equipment

Explosion safety

The chlorine electrolysis system CHLORINSITU® IV compact generates a small amount of hydrogen.

This hydrogen must be safely discharged into the ambient air.

Checks must always be carried out during installation to ascertain that there are no suction points (e.g. belonging to an air conditioning system) near the hydrogen discharge.

If hydrogen is released by damage to a pipeline or due to another cause, it could form an explosive gas mixture with the existing air.

Requirements applying to the organisation

- According to ATEX 137, the operator must draw up an explosion safety document.
- The chlorine electrolysis system CHLORINSITU® IV compact must be incorporated in the emergency plan and indicated on the outlines of the safety drawings.
- No escape routes may pass by the chlorine electrolysis system CHLORINSITU® IV compact.
- The operator must name a safety coordinator. This person is responsible for monitoring work that has an effect on the system's explosion safety.

Personal protective equipment

The operator must match the personal protective equipment to the hazards, according to the national regulations, see also ↳ *'Note for the system operator' on page 10*.

Information in the event of an emergency

The operator must supplement the emergency information to match the hazards, according to the national regulations, see also ↳ *'Note for the system operator' on page 10*.

- As soon as a chlorine gas smell is detected switch of the electrolysis system using the *[START/STOP]* key, by pulling out the plug, activating an emergency stop switch or triggering an external fuse and then inform service.
- If an electrical emergency occurs, immediately de-energise the electrolysis system: either pull out the plug, activate an emergency stop switch or trigger an external fuse and then inform service.

Sound pressure level

The sound pressure level is < 70 dB (A) at maximum power (without the booster pump)

5 Overview of equipment

Overview of equipment - CHLORINSITU® IV compact

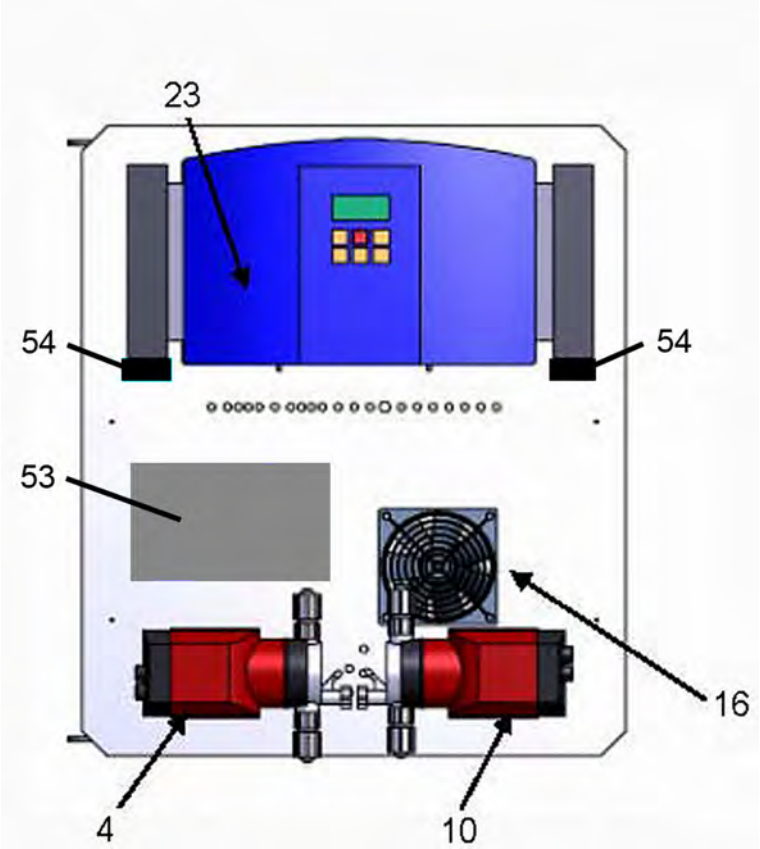


Fig. 1: Outside parts - without protective cowling

4	Brine pump
10	Alkali (lye) pump (option)
16	Fan membrane cell
23	Control unit
53	Terminal box
54	Fan cooling fins (only type 50)
not shown	Brine tank with suction lance

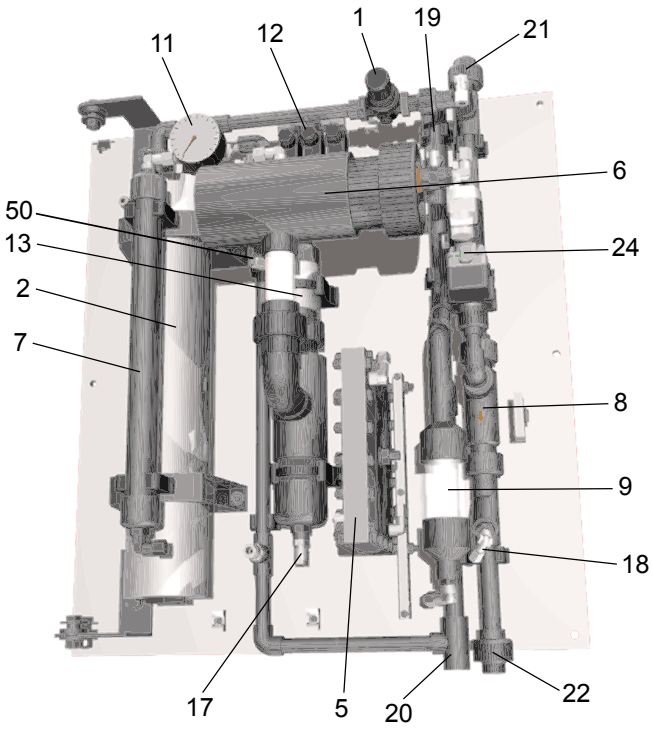


Fig. 2: Inside parts

1 Reducing valve
2 Water softener unit
5 Membrane cell
6 Float housing
7 Active carbon filter
8 Injector
9 Alkali (lye) tank (option)
11 Manometer
12 Valve block
13 Plunger
17 Chlorine metering point
18 Alkali (lye) metering point (option)
19 Bleeding
20 Drainage
21 Circulation water, inlet
22 Circulation water, outlet
24 Valve injector for chlorine
50 Reed switch,internal flow

6 Functional description

6.1 The electrochemical process

Cooking salt (NaCl) is dissolved in water in the brine tank to form a saturated solution. This solution is fed into the anodic chamber of a membrane cell. Here the chloride ions (Cl-) of the cooking salt loose their negative charge at the anode to form chlorine, while the Na+ ions migrate through the membrane to the cathodic chamber.

At the cathode, water ($_2$O) is electrolytically split into hydrogen (H_2) and hydroxide ions (OH-). Sodium hydroxide solution (NaOH) is formed from the sodium and hydroxide ions.

Anodic reaction: $2\ Cl^- \rightarrow Cl_2 + 2e^-$

Cathodic reaction: $2\ H_2O + 2\ e^- \rightarrow H_2 + 2\ OH^-$

The generated chlorine dissolves in water as hypochlorous acid (HOCl) and is sucked out of the system: $H_2O + Cl_2 \rightarrow HOCl + HCl$

6.2 System

The CHLORINSITU® IV compact is connected to a circulation line. Circulation water (10) flows from above into the CHLORINSITU® IV compact (for numbers - see chapter "Overview of equipment"). A part is softened in the softener (2). The pressure of the circulating water must be reduced to at least 1 bar with the aid of the manometer (11) and the reducer valve (1). The control fills the brine tank (3) with softened water. Brine forms in the brine tank (3). Using the brine pump (4), the brine is pumped into the anodic chamber (+) of the membrane cell (5). The chlorine gas separates out in the membrane cell (5). Pumping of fresh brine into the anode chamber causes the depleted brine to be transported through the cell and then siphoned off with the chlorine gas. The control unit also replaces the water of the cathodic chamber (-).

Water is continuously pumped into the cathodic chamber so that the concentration is maintained at an optimum within it. The alkali (lye) and the hydrogen are separated at the output of the membrane cell (5). The hydrogen is discharged to the outside (19). Optionally the alkali (lye) can be trapped in the alkali tank (9) and dosed into the circulating water as required using the alkali pump (10).

The fan (13) is used to cool the membrane cell.

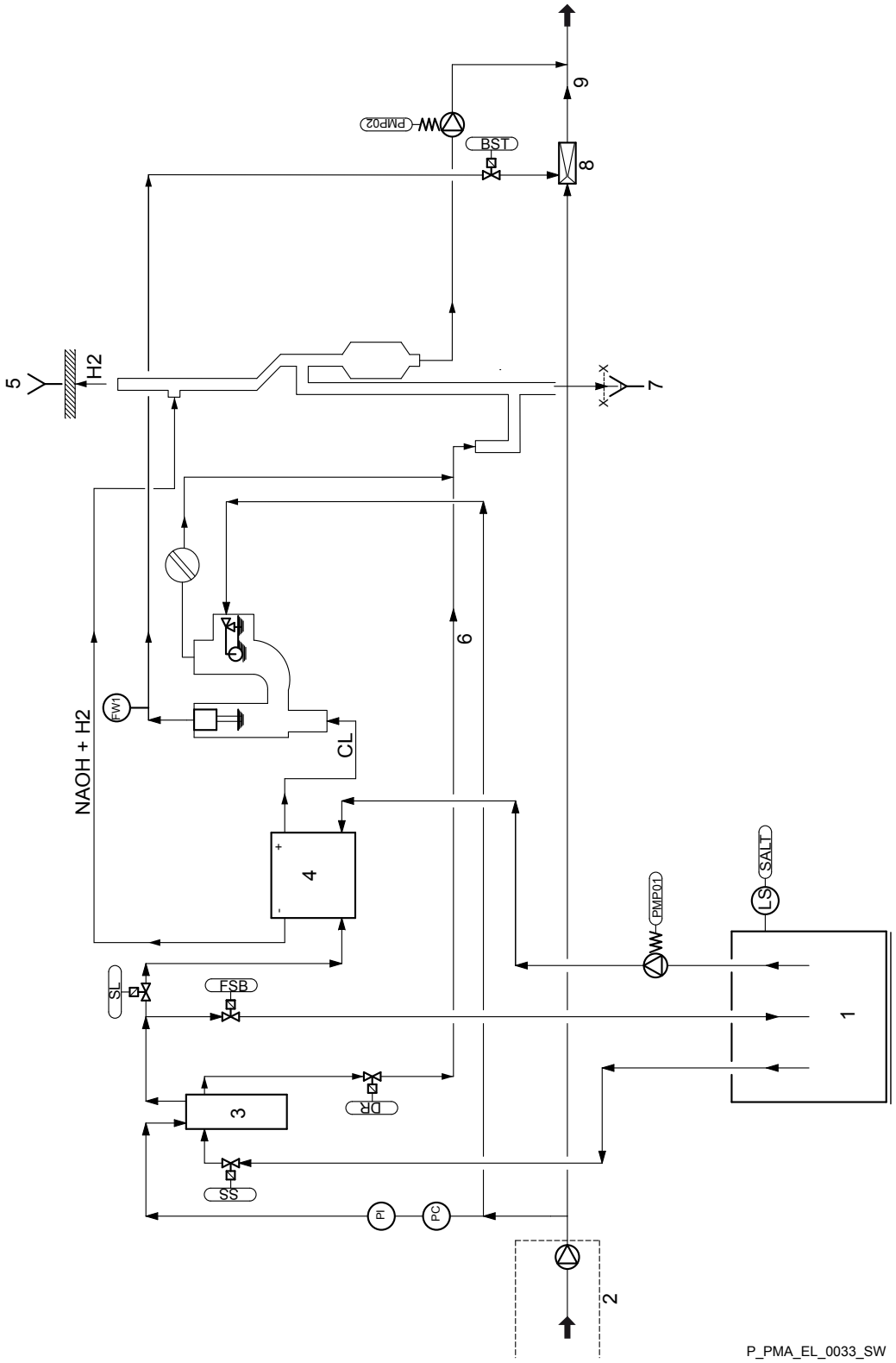


Fig. 3: Hydraulic circuit diagram Chlorinsitu IV compact

1 Brine tank
2 Booster pump
3 Water softener unit
4 Membrane cell
5 Exhaust air
6 Rinsing water
7 Drainage
8 Injector
9 Circulating water

6.3 Operating modes

In the standard set-up, the production of the CHLORINSITU® IV compact is controlled with an external chlorine and pH-controller. The operating mode can be selected in the user menu. There are four standard operating modes:

- Manual mode "M"
- On / Off "I"
- Pulse signal "F"
- Analog signal "A"

Additionally, it is possible to equip the CHLORINSITU® IV compact with an internal chlorine and pH-control. In the user menu, this is located under:

- Sensor "R"

Manual mode "M"

WARNING!
As no chlorine measurement system is available, overdosing may occur.

The CHLORINSITU® IV compact is set to the desired chlorine production quantity (in percent). As soon as an external release (ENABLE) is available, the desired quantity of chlorine is produced.

On / Off "I"

The CHLORINSITU® IV compact is set to the desired chlorine production quantity as in manual mode "M". An external, potential-free contact of a chlorine and pH controller is used to switch the system on and off.

Pulse signal "F"

Many chlorine and pH controllers operate with an output signal in the form of pulses. The maximum number of pulses from the controller (for 100 % production) must be set in the control unit of the CHLORINSITU® IV compact.

Analog signal "A"

The CHLORINSITU® IV compact can be connected to an analog standard signal (4-20 mA). N.B.: 20 mA corresponds to maximum chlorine and pH metering (100%).

Sensor "R" (option)

The CHLORINSITU® IV compact can be equipped with an internal chlorine and pH controller, see the following chapter. Metering by the system then depends on the chlorine and pH value.

6.4 Options

The standard version of the chlorine electrolysis system CHLORINSITU® IV compact can be expanded with 3 options:

- pH correction
- Integrated chlorine / pH controller
- Booster pump

All 3 options can also be combined.

6.4.1 pH correction

Additionally, the system has an alkali (lye) metering pump (10), an alkali tank (9), in which the alkali from the cell is captured, and an alkali metering point (18).

The alkali metering pump injects the alkali downstream of the injector (where the pH value is low) according to the displayed pH value in the circulation line. This prevents limescale formation.

6.4.2 Integrated chlorine / pH controller

The option integrated chlorine / pH controller comprises an in-line probe housing with a Cl sensor, a pH sensor and a software add-on. Here it is also possible to connect an external acid pump, so that the pH correction operates in both directions.

6.4.3 Booster pump

The system requires a priming pressure of approx. 1.5 bar and circulation capacity of at least 500 litres per hour. With a priming pressure below 1.0 bar, the water softener does not function correctly, which results in damage to the membrane cell.

In most cases a booster pump is required to reach this pressure.

7 Requirements for the installation site

NOTICE!

The ventilation must be operational as soon as the system is running.

In certain cases, natural ventilation may be sufficient.

- It must be possible to seal-off the site of installation to prevent access.
- The climatic data for system and brine tank must correspond to the values given in the chapter "Technical Data".
- The installation site must be ventilated with at least 5 m³/h per m³ room volume.
- It must be ensured that the hydrogen can rise upwards into the outdoor air or into a suitable discharge line.

8 Installation

8.1 Installation, hydraulic

The CHLORINSITU® IV compact must be mounted horizontally on a level wall.

After a week always check that the tubes are still correctly sealed, if necessary tighten the tubes.

Refer to the following layout drawing as a guide to the hydraulic installation.

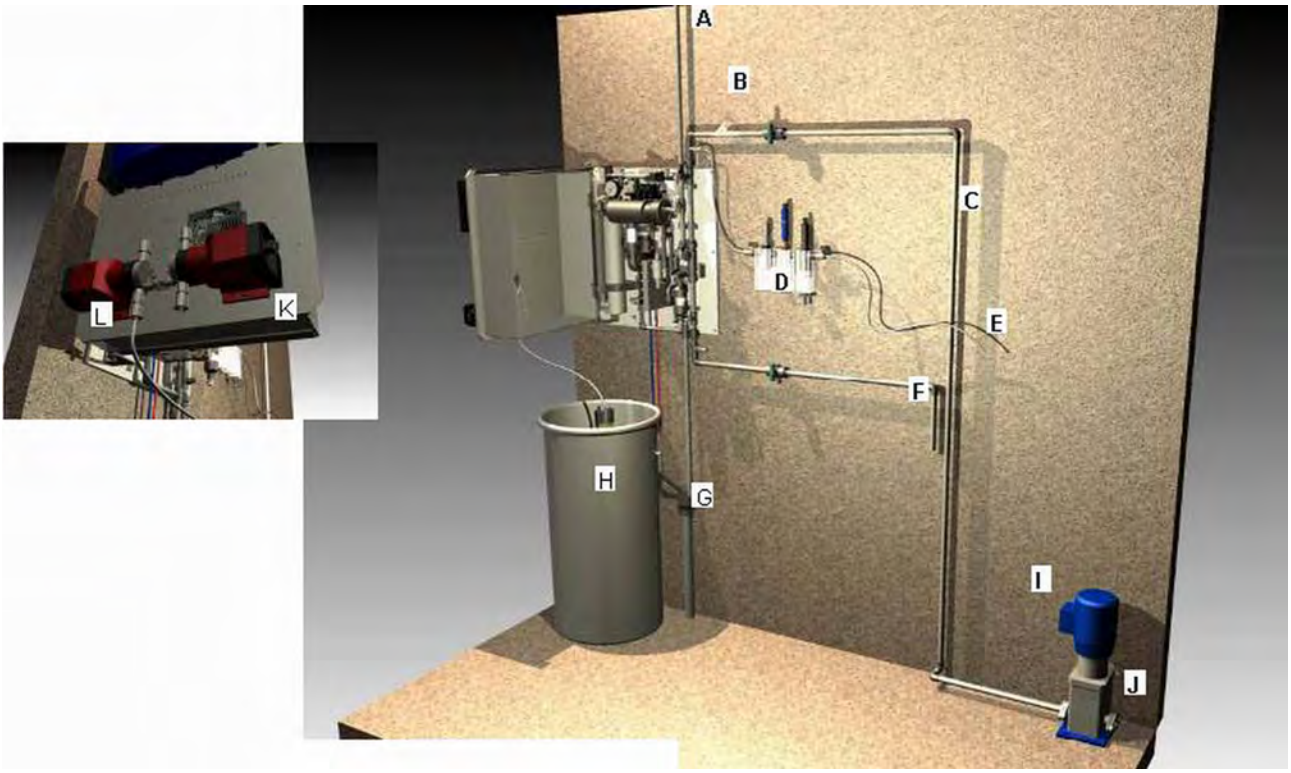


Fig. 4: Layout drawing, large figure: Overview of the overall installation with opened CHLORINSITU® unit, left above the brine tank. Small figure: View of its opened front part with the metering pumps.

A The hydrogen exhaust duct rising uniformly upwards to the outside with the supplied EX-sticker on the outside of the pipe.
B A filter insert (GF 192 305 300) with filter mesh (0.5 mm) is recommended.
C Supply pressure to the booster pump (option) at least 1 bar.
D The flow valves with sensors (option)
E The returning sample water can be fed to drainage or back to the splash water tank.
F Return to the process water.
G Lead the brine tank overflow into the drainage pipe.
H Brine tank
I Booster pump (option)
J Process water, input
K The second metering pump (option) is provided for the pH correction option.
L Brine pump

8.1.1 System connections

CAUTION!

The hydrogen exhaust dust be fed to the outside. Lead the hydrogen exhaust duct directly upwards through the roof to the outside. In all cases, the hydrogen exhaust duct must rise continuously.

Attach the supplied EX-stickers to the exit point of the hydrogen exhaust duct on the roof.

The drainage line to the sewerage system must have a diameter of at least Ø40 mm. The system drainage line and the brine tank overflow may be combined. This piping method provides an effective way for checking whether the drainage is blocked.

8.1.2 Connecting to the circulation line

The CHLORINSITU® IV compact must be connected to a circulation line, if available, behind the filter.

Depending on the size of the pipe, the CHLORINSITU® IV compact is connected to the main pipe or a bypass.

Parameter	Desired value	Minimum value	Maximum value
Input pressure P1 [bar]	1.5	1.0	6
Pressure difference at the injector Δp [bar]	1.0	0.8	4.5
Water flow through the injector [l/h]	approx. 500	approx. 450	approx. 1500

It is recommended that for the operating safety of the system, an input pressure of 1.5 bar is maintained directly prior to the system. The water flow automatically adjusts itself due to the pressure difference at the injector. If there is no pressure difference relative to the circulation line, a booster pump must be installed.

To attain the pressure difference there are 2 options:

1 - With booster pump

2 - Without booster pump

The following drawings show the installation of the CHLORINSITU® IV compact in the circulation line.

8.1.2.1 With booster pump

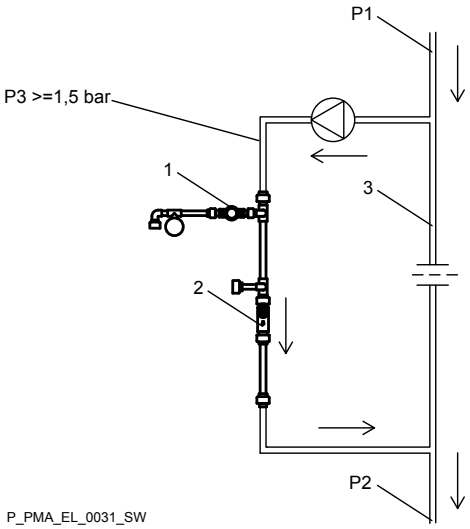


Fig. 5

1 Pressure reducer in the system water inlet
2 Injector
3 Circulation line

Comes into consideration for:

- Input pressure P1 < 1.3 bar
- Back pressure P2 > 0.5 bar

8.1.2.2 Without booster pump

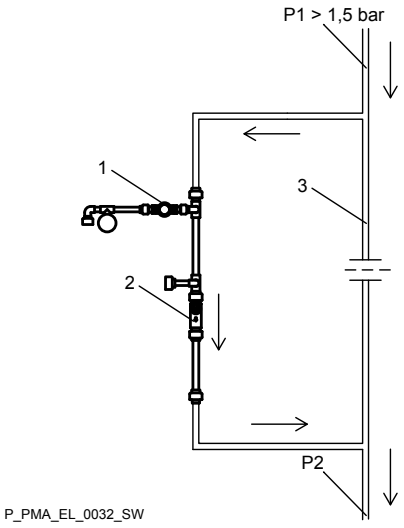


Fig. 6

1 Pressure reducer in the system water inlet
2 Injector
3 Circulation line

Comes into consideration for:

- Back pressure P2 = max. input pressure P1 - 1 bar

8.1.3 Brine tank

Connect the colour tubes from the brine tank to the connectors at the valve block, see drawing *on page 21*.

Connect the transparent tube to the suction valve of the brine pump.

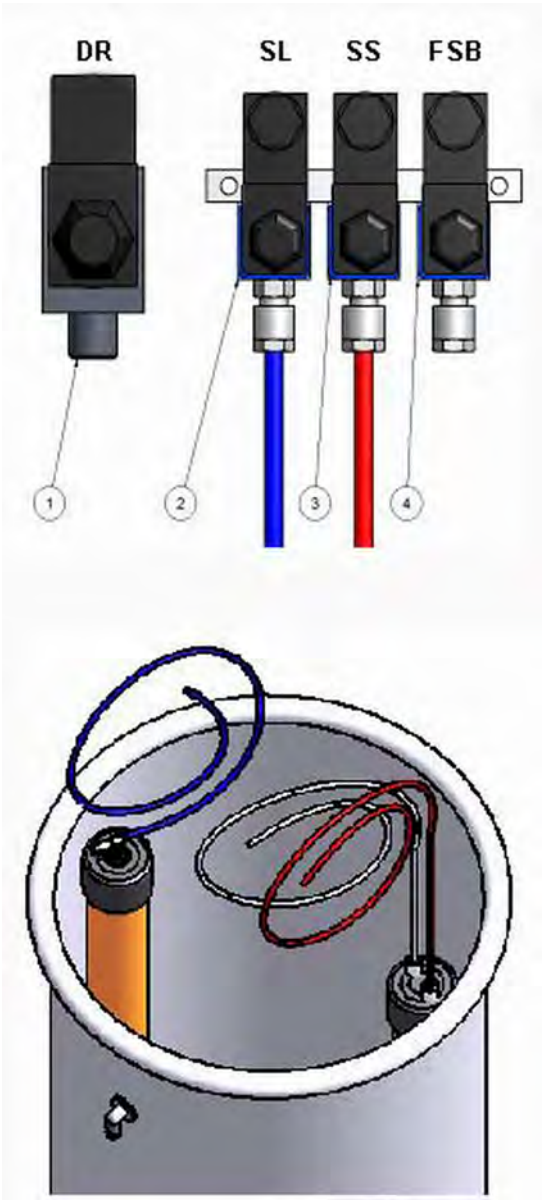


Fig. 7: Hydraulic installation of the brine tank and valve block

1 Water softener drainage (to the sewage system)
2 Filling on the brine tank (blue)
3 Brine suction to the water softener (red)
4 Fill cathode - water

8.2 Installation, electrical

For all electrical connections are refer to the wiring diagram - see appendix.

CHLORINSITU® IV compact is supplied with a mains cable. It is recommended that a wall power outlet is installed close to the system.

It is recommended that CHLORINSITU® IV compact is connected to a special power circuit, which is rated 16 A (at least 6 A).

Below the electrical installation of these components is described:

1 - Booster pump (option)

2 - External controller (if available)

3 - Chlorine and pH electrodes for internal measurement (option)

4 - Flow switch for flow valve

5 - External enable

8.2.1 Booster pump (option)

The terminal box with a solenoid switch and a motor protection switch is mounted between the booster pump and the control unit.

Connect protective earth (PE), live (L) and neutral (N) to the terminals of the motor protection switch.

Fig. 8

The booster pump is switched on and off via an external enable signal (ENABLE contact).

Once the enable signal is no longer applied, the booster pump continues to run for a further 10 seconds before stopping.

8.2.2 External controller (if available)

Connect both the **On/Off control** and also the **Control via a pulse output** to the corresponding potential-free contact of the chlorine controller at the following terminals:

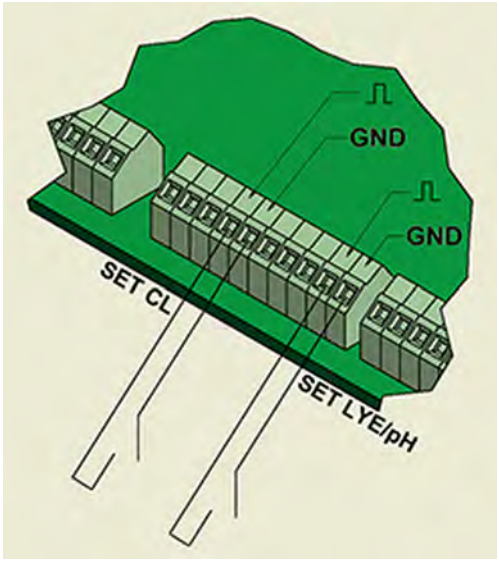


Fig. 9

With alkali (lye) metering only: Connect the appropriate potential-free contact of the alkali (lye)/pH controller to the corresponding terminals.

For a **controller with 4-20-mA output** there are two options:

1. Connect an active signal from the chlorine controller as follows:

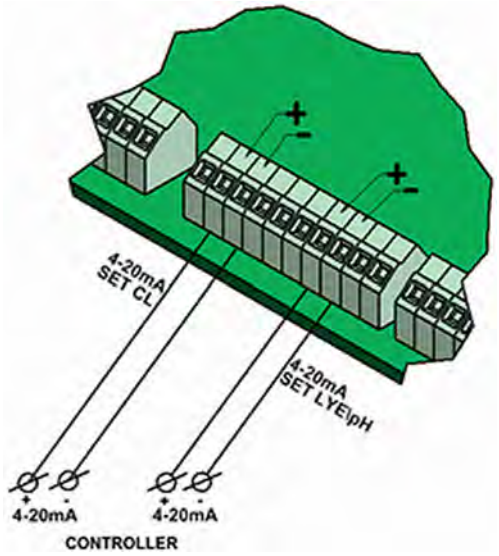


Fig. 10

With alkali (lye) metering only: Connect an active signal from the alkali/pH controller accordingly.

2. Connect a passive signal from the chlorine controller as follows:

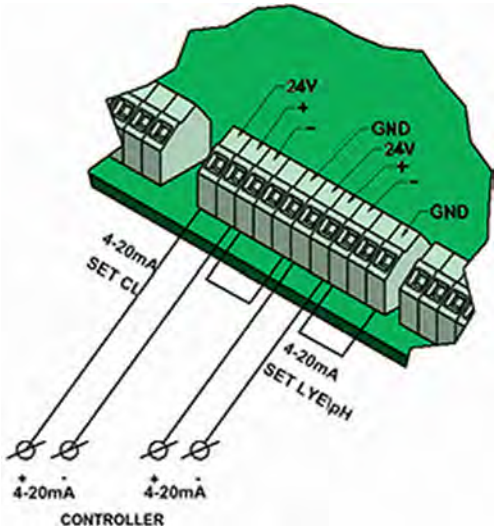


Fig. 11

For chlorine the "24 V" terminal of the Chlorinsitu control unit must be connected to the "+" terminal of the controller and the "+" terminal on the PCB to the "-" terminal of the controller. The connectors "-" and GND on the PCB must be connected to each other.

With alkali (lye) metering only: Connect a passive signal from the alkali/pH controller accordingly.

8.2.3 Sensors for integrated chlorine and pH controller (optional)

Connect the chlorine sensor and the measuring transducer of the pH sensor to the terminals of the control unit as shown:

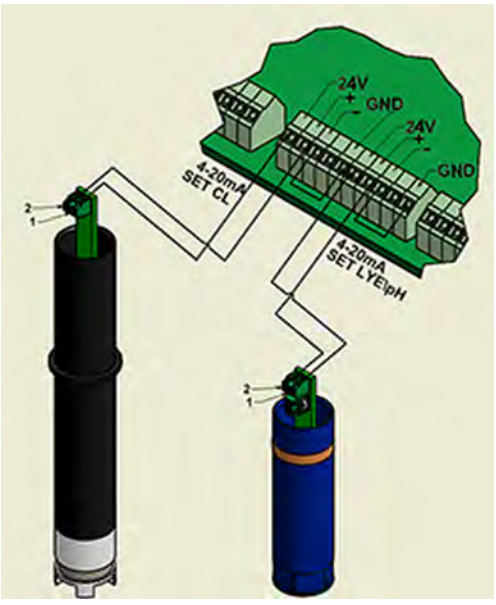


Fig. 12

8.2.4 Flow switch of the flow valves

An internal flow contact (reed switch), which internally monitors the flow, is connected to the FLOW terminals of the control unit.

An (external) flow contact of a flow valve can be connected in series with it:

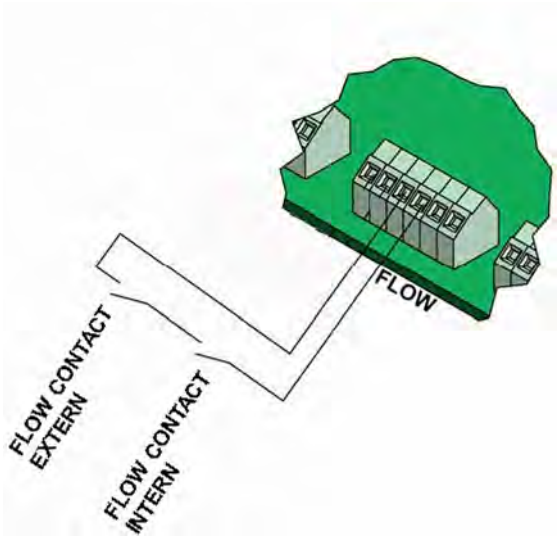


Fig. 13

8.2.5 External enable

An external, potential-free contact issues the release for production via the ENABLE terminal of the control unit:

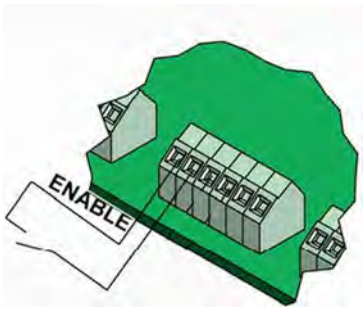


Fig. 14

This contact can come from a flow contact in the circulation line or from another control.

WARNING!

Warning of chlorine gas discharge

If the ENABLE terminal is not correctly allocated and there is no flow in the circulation line, a chlorine bubble can form in it. When the flow is reconnected, the chlorine bubble is transported into the swimming pool.

– Connect a flow contact in the circulation line correctly to the ENABLE terminal, if no other effective solution is applied.

8.2.6 Brine tank

The cable for the level switch is located inside the brine tank alongside the blue hose. The level switch is a potential-free contact that is connected to the SALT terminals as follows:

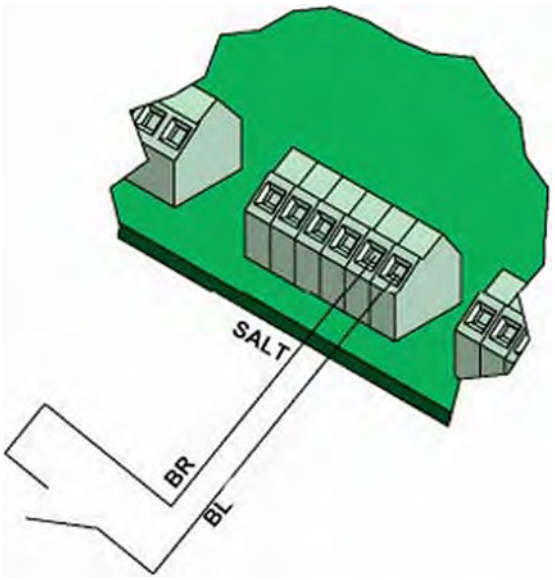


Fig. 15: BR = brown, BL = blue

If the brine tanks is empty, the level switch contact must be closed.

9 Adjustment

9.1 General

Operating menu, schematic

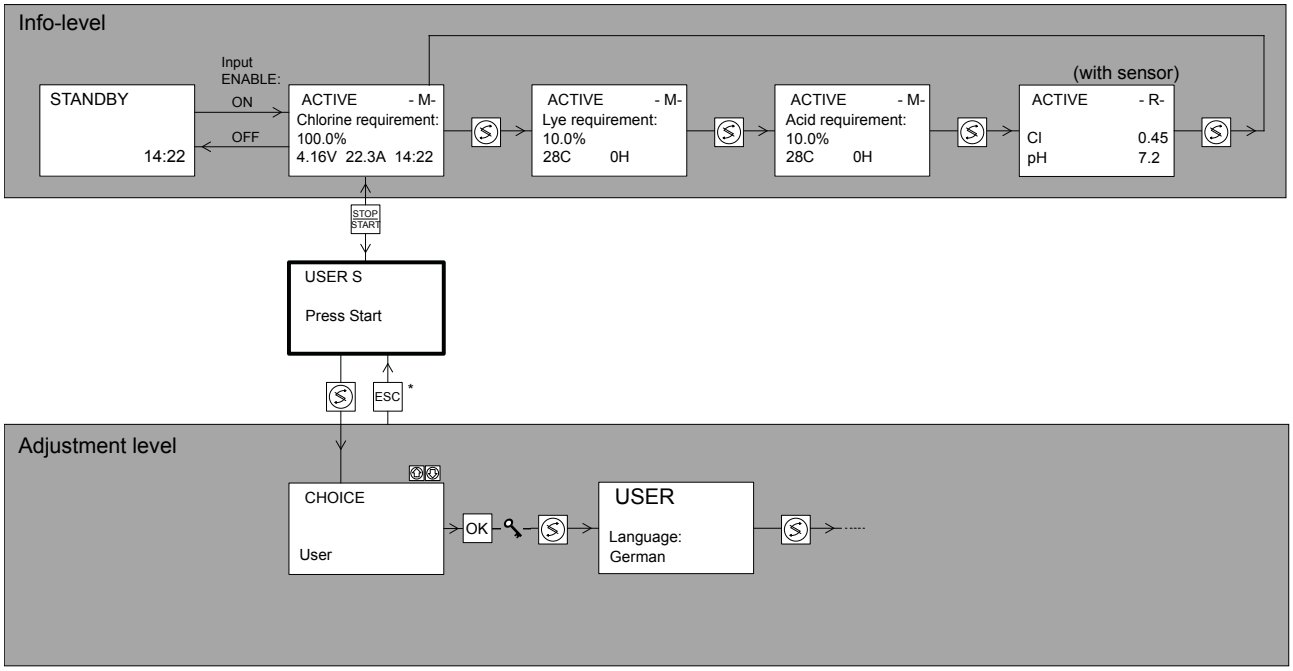


Fig. 16: Operating diagram

🔧 Entering the access code

- *The central menu item 'USER S' means user stop) is the linchpin of the operating menu! It is between the Info-level and the Adjustment level. Therefore it makes sense to become familiar with its layout.*
- *If you want to jump quickly from the adjustment level to the central menu item 'USER S', press the [ESC] key 2x.*

Changing the settings

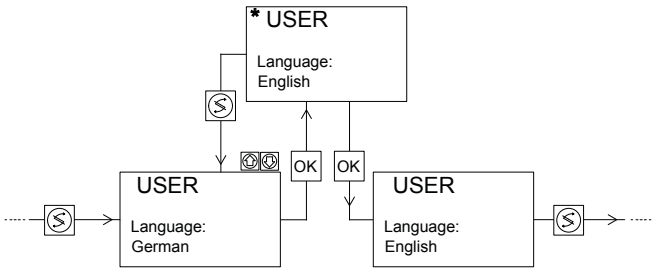


Fig. 17: Adjustment

1. To change the selection in a display, use the *[Arrow keys]*.
   ⇨ A " * " appears at the top left.
2. To save the change, press the *[OK]* key.
   ⇨ The symbol " * " disappears.

3. To discard the change, press the *[S]* key.

Access codes

The menus are protected using access codes with the following levels:

Name	Enables ...	Access code
'User'	Enables functions which trained personnel must use in their day-to-day work.	999
'Manufacturer'	For basic settings during commissioning and maintenance.	Only known by suitably trained personnel such as customer service employees.

INFO-level

The INFO-level is reached from the *'USER S'* display by pressing the key *[START/STOP]*. It comprises the continuous displays - see Fig. 16:

- *'STANDBY'*
- Chlorine requirement
- Lye requirement
- Acid requirement
- Chlorine / pH measuring display (only with sensors)

The continuous displays also display information about:

- Cell voltage
- Cell current
- Time
- Control unit temperature PCB
- Operating hours
- Chlorine concentration in ppm (only with sensors)
- pH value (only with sensors)

Status of the system in continuous displays

Status	Explanation	Membrane cell and metering pumps
ACTIVE	Input ENABLE closed	On standby
STANDBY	No enable - open ENABLE input	Not on standby
ERROR	Error	Not on standby
STARTUP	Setup menu for initial commissioning	Menu-controlled metering pumps

The status contacts react to the change between ACTIVE and STANDBY or ERROR.

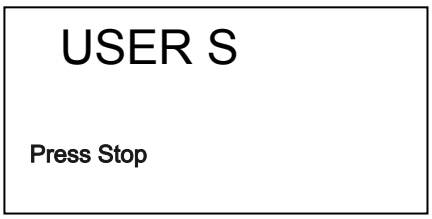
The error contacts react to the change between ERROR and when the error is cleared.

ADJUSTMENT level

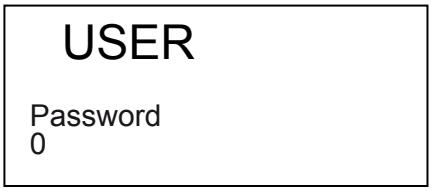
Settings - general approach

To be able to adjust something, the system must first be stopped and the password available:

1. Press the *[START/STOP]* key.
   ⇨ The following appears:



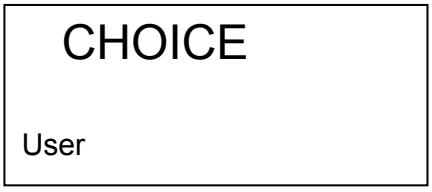
2. For example, if a setting is to be made in the menu *'User'*, press the *[OK]* key.
   ⇨ If password protection is set the following appears:



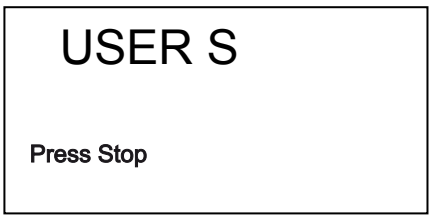
3. Using the *[DOWN]*, set the *'User Password'* (999), confirm by pressing the key *[OK]* and then press key *[S]*.

> *If no other key is pressed, password setting lapses. Press [ESC] to go back.*

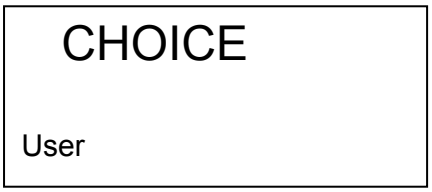
4. Press the *[S]* key.
   ⇨ The following appears:



5. In the *'Choice'* top level menu use the *[Arrow keys]* to select the desired menu.
6. Make the desired settings in the menu. After the last entry, press the *[OK]* key.
   ⇨ *'USER S'* re-appears:



7. To exit a menu without saving the settings, press the *[S]* key.
   ⇨ The following appears:



The software has the menu structure shown here:

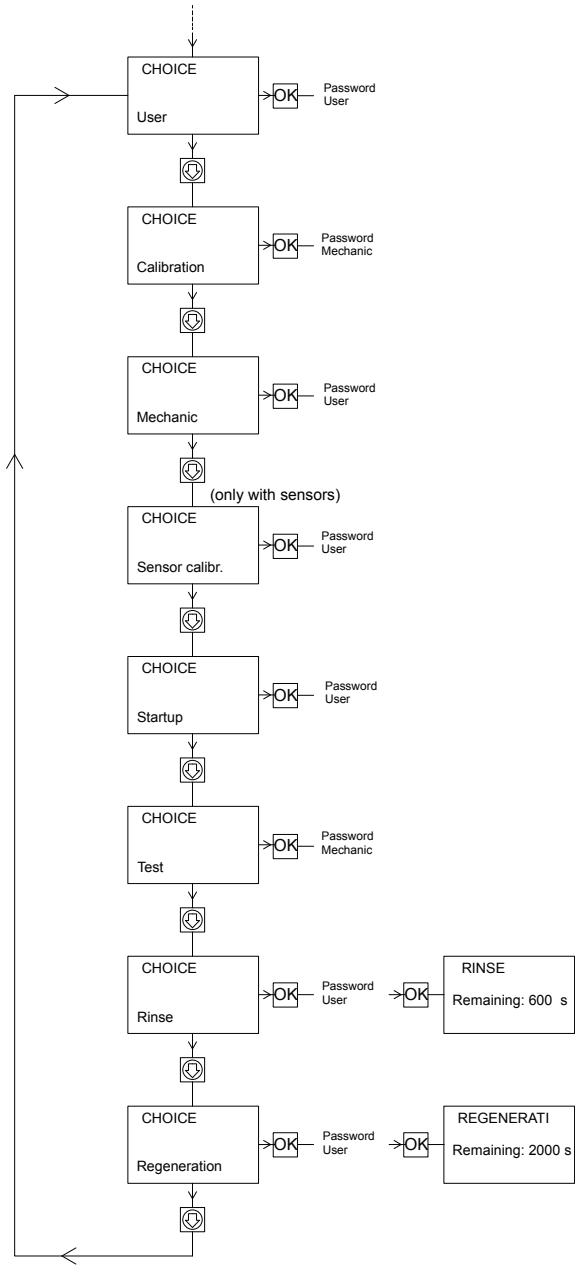


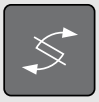
Fig. 18: Overview "Choice"

Menu identifiers

Description	Explanation
'USER'	User settings menu
'CALIBRATION' *	Calibration menu for standard signal inputs mA
'MANUFACTURER'	Manufacturer settings menu
'SENSOR CALIBR.'	Calibration of the chlorine and pH sensors
'STARTUP'	Setup menu for initial commissioning
'TEST' *	Test the components and functions
'RINSE'	Rinsing the system
'REGENERATE'	Regenerates the water softener

* *'Manufacturer'* password necessary

Functions of the keys

System key	Portrayal in the text	Functions
	*[S]*	Change between the continuous displays or menus Continue without saving
	[START/ STOP]	Stop/Start
	[OK]	Save and / or forward
	[DOWN]	Change the value or selection in the menu
	[ESC]	Back to the top menu *'Choice'* / Central menu item *'User S'*
	[UP]	Change the value or selection in the menu

9.2 User menu

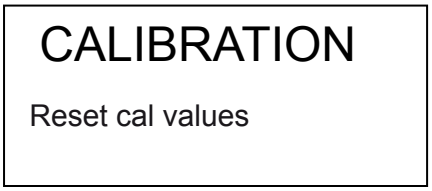
For a description of the *'User'* menu - see "Start up".

9.3 Menu Calibration mA

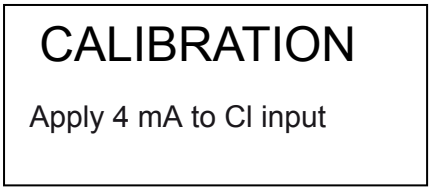
This menu is used to calibrate the 4-20 mA inputs - only for trained service personnel or upon consultation with the supplier.

The menu is only available in English.

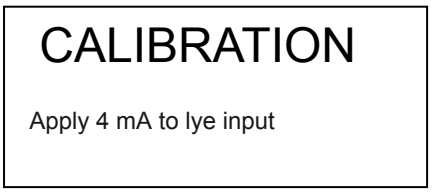
The *'Manufacturer'* password is required.



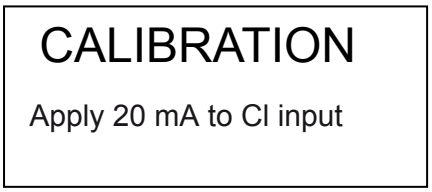
1. To reset the existing values, press the *[OK]* key.
   ⇨ The following appears:



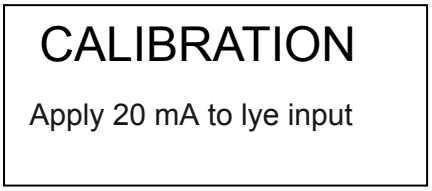
2. Apply 4 mA to the chlorine input and confirm with the *[OK]* key.
   ⇨ The following appears:



3. Apply 4 mA to the alkali (lye) input and confirm with the *[OK]* key.
   ⇨ The following appears:



4. Apply 20 mA to the chlorine input and confirm with the *[OK]* key.
   ⇨ The following appears:

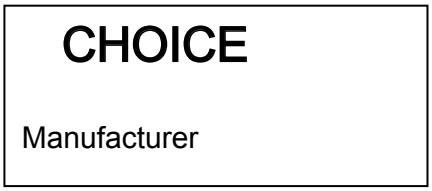


5. Apply 20 mA to the alkali (lye) input and confirm with the *[OK]* key.
   ⇨ The following appears:

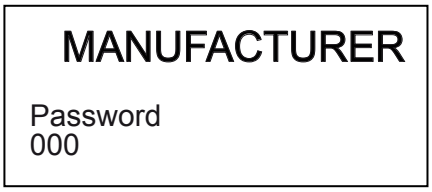
6. To confirm the new values, press the *[OK]* key.

9.4 Menu manufacturer

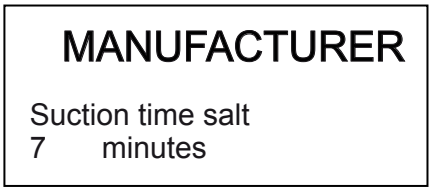
This menu is intended solely for authorised personnel.



1. To access the menu, press the *[OK]* key.
   ⇨ The following appears:

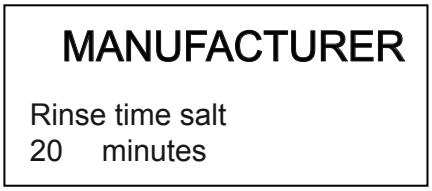


2. Use the *[DOWN]* key to set the password.
3. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:



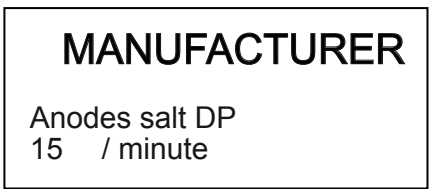
   This is where the duration for which the brine pump draws up brine is set during regeneration of the water softener.

4. Set the desired value (*[arrow keys]*).
5. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:



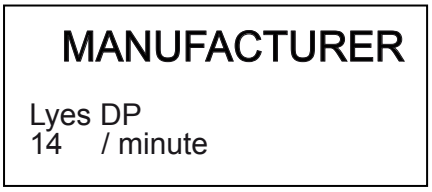
   This is where the total regeneration time of the water softener is set, i.e. the salt suction time plus the rinse time.

6. Set the desired value (*[arrow keys]*).
7. Press the *[OK]* key and then the *[S]* key.
   ⇨ Only with alkali pump: The following appears:



   The stroke rate for brine is set here for 100% production.

8. Set the desired value (*[arrow keys]*).
9. Press the *[OK]* key and then the *[S]* key.
   ⇨ Only with alkali pump: The following appears:

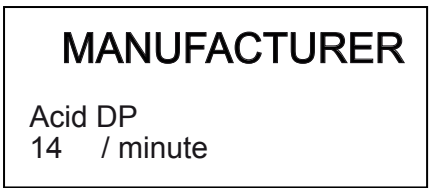


The stroke rate for alkali is set here for 100% alkali requirement

CAUTION!
Alkali (lye) cannot be metered for longer than it is produced for.

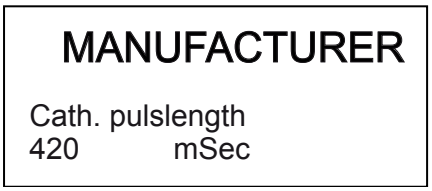
Enough alkali must remain to neutralise the low pH value downstream of the injector.

10. Set the desired value (*[arrow keys]*).
11. Press the *[OK]* key and then the *[S]* key.
    ⇨ Only with acid pump: The following appears:



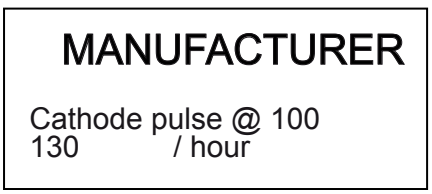
The stroke rate for acid is set here for 100% acid requirement

12. Set the desired value (*[arrow keys]*).
13. Press the *[OK]* key and then the *[S]* key.
    ⇨ The following appears:



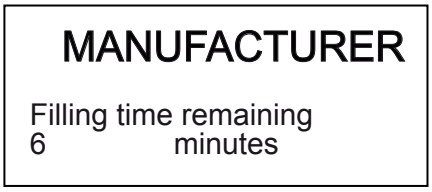
This is where the duration per pulse of opening of the solenoid valve SL for filling the cathode is set.

14. Set the desired value (*[arrow keys]*).
15. Press the *[OK]* key and then the *[S]* key.
    ⇨ The following appears:



This is where the number of pulses sent to the solenoid valve SL per hour is set in order to fill the cathode.

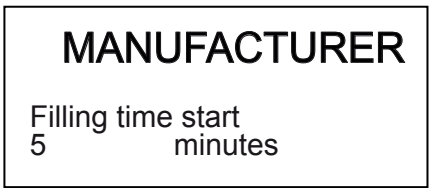
16. Set the desired value (*[arrow keys]*).
17. Press the *[OK]* key and then the *[S]* key.
    ⇨ The following appears:



    The remaining time is set here for which the brine tank should be filled beyond the filling time.

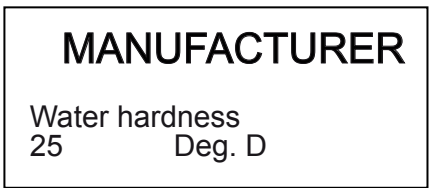
    Explanation: As soon as the minimum level in the brine tank is exceeded, a level switch triggers. The control unit opens the solenoid valve FSB in order to fill the brine tank. As soon as the minimum level in the brine tank is exceeded, a post-rinse/flush period starts to count down (*'Filling time remaining'*). To completely fill the brine tank, the control unit holds the solenoid valve FSB open for this *'Filling time remaining'*.

18. Set the desired value (*[arrow keys]*).
19. Press the *[OK]* key and then the *[S]* key.
    ⇨ The following appears:



    If the liquid level in the brine tank falls too low, the liquid level must once again reach the specified level within the time set here. If not the system reports *'Brine level low'*.

20. Set the desired value (*[arrow keys]*).
21. Press the *[OK]* key and then the *[S]* key.
    ⇨ The following appears:



    The water hardness to be used for the water softener is set here.

    (This value specifies the time interval between two regenerations of the water softener.)

22. Set the desired value (*[arrow keys]*).
23. Press the *[OK]* key and then the *[S]* key.

9.5 Menu Calibrate sensor

For a description of the *'Calibrate sensor'* menu - see "Start up".

9.6 Menu Setup

For a description of the *'Setup'* menu - see "Start up".

9.7 Menu Test

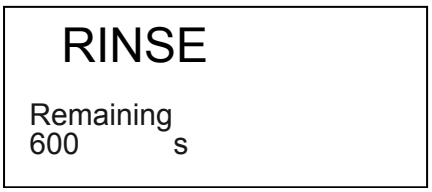
The *'Manufacturer'* password is required.

9.8 Menu Rinse

The system can be rinsed through via this menu.

→ In the *'Choice'* menu select the menu *'Rinse'* (*[Arrow keys]*) and press the *[OK]* key.

⇨ The following appears:



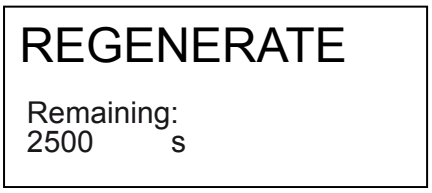
Once the *'Remaining'*, time has elapsed, the control jumps to the central menu item *'USER S'*.

9.9 Menu Regenerate

This menu is used for the manual regeneration of the water softener.

→ In the *'Choice'* menu select the menu *'Regenerate'* (*[Arrow keys]*) and press the *[OK]* key.

⇨ The following appears:



Once the *'Remaining'*, time has elapsed, the control jumps to the central menu item *'USER S'*.

10 Start up

To ensure subsequent trouble-free operation, we recommend start up of the system by the supplier.

The following steps are necessary:

1 - Prepare brine

2 - Check conditions

3 - Only for initial start up: Run through the *'SETUP'* menu

4 - Run through the *'USER'* menu

5 - Check the operating parameters

6 - Only with sensors: Calibrate sensors

7 - Rinse water softener (optional)

The table with the factory settings is at the end of the operating instructions.

10.1 Prepare brine

NOTICE!
Adhere to the "requirements relating to the starting substances" - see below.

- *Optimally, prepare the brine the preceding evening, as it takes a certain time until the brine has attained the correct concentration.*
- *Preferably use softened water. If softened water is not available, then for the initial set up, tap water may be used.*

→ Fill the brine tank with at least 2 bags of salt (each 25 kg) and water up to approximately 40 cm above the bottom.

10.1.1 Requirements applying to the starting substances

Salt

Optimally a so-called vacuum salt is most suitable.

For human use, it must be of food-quality.

To ensure a long service life for the membrane cell salt with as few impurities as possible should be used.

Use regeneration salt with:

Minimum grain size	0.38 mm

Anti-clogging agent max.	20 ppm

The quality must correspond to quality B for human use in accordance with the latest version of DIN EN 973:

NaCl, min.	99.4 % by weight

Additionally, these special limit values of van den Heuvel apply for electrolysis systems:

Property		Value	Unit
Calcium, max.	Ca+	15-70	ppm
Magnesium, max.	Mg+	15-70	ppm
Bromine	Br	4	ppm
Arsenic	As	10	ppm
Antimony	Sb	10	ppm
Cadmium	Cd	10	ppm
Chromium	Cr	10	ppm
Lead	Pb	10	ppm
Mercury	Hg	10	ppm
Nickel	Ni	10	ppm
Selenium	Se	10	ppm
Carbonate	Na_2CO_3	150	ppm
Sulphate	Na_2SO_4	40	ppm
Iron	Fe	4	ppm
Copper	Cu	0.1	ppm
Iodine	I	4	ppm
Silicate	SiO_2	40	ppm
Aluminium	Al	0.4	ppm
Insoluble substances, max.	-	100	ppm

NOTICE!

An incorrect salt can destroy the membrane cell.

In cases of doubt, van den Heuvel will be happy to advise you:

For contact data see the published by information.

Water

Use fresh potable water according to the existing WHO guidelines.

Property	Value	Unit
Water hardness, max.*	45	°dH

* If the water hardness is higher, contact the supplier.

10.2 Check conditions

NOTICE!

Before start up of the Chlorinsitu® IV compact, a series of points must be checked:

No.	Check point	OK?
1	Brine tank filled with at least 2 bags of salt (each 25 kg) and water up to approximately 40 cm above the bottom	
2	Lines are clean and free from swarf or chips	
3	Water pressure downstream of the reducing valve is between 1 and 1.6 bar	
4	Hydrogen exhaust duct is routed to the outside and an Ex- sticker has been stuck on	
5	Room ventilation is adequate	
6	Drainage line to the sewer system is sufficiently large and has a sufficient drop	
7	Water hardness upstream and downstream of the water softener	
8	Connection of the ENABLE input is correct	
9	Connection of the control signal (Option) is correct	

10.3 Run through the SETUP menu

Only required for the first system start.

1. Prior to the system start the conditions for this must be checked, see *Chapter 10 'Start up' on page 38*.
2. Before the system is connected to the mains voltage, the shut-off valve in the circulation line must be opened.
3. Check the supply voltage.

4. Insert the plug in the power socket.

   ⇨ If the ENABLE contact is closed, the booster pump starts (optional).

   If the system is connected to the mains voltage for the first time, the LCD screen automatically shows the *'Setup'* menu.

SETUP 1/4	
Salt Level ok?	
OK= Yes	ESC= End

If problems arise during the first system start, press the [ESC] key: the system stops ('USER S').

After clearing the problem, briefly disconnect the system from the mains voltage: the 'SETUP' menu reappears.

5. To confirm that the brine tank is correctly filled with salt and water, press the *[OK]* key.

   ⇨ The next display appears:

SETUP 2/4	
Anode filled?	
OK= Yes	ESC= End

Simultaneously, the brine pump pumps brine at its maximum stroke rate into the anode chamber and the tubes. Therefore:

Fig. 19: Pump bleed valve

6. While the pump is running, bleed the suction line. To do this screw open the bleed valve (in the anticlockwise direction).

7. After bleeding, screw the bleed valve in until it is correctly closed (clockwise direction).

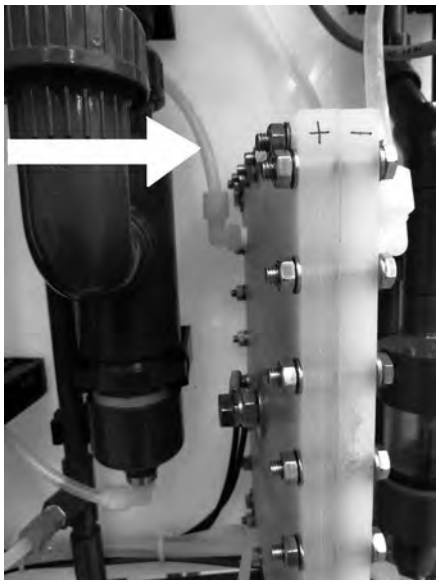


Fig. 20: Necessary liquid level in the tube to the membrane cell, anode side.

8. Now check that the pump on the anode side of the membrane cell has completely filled the tube to the membrane cell and that liquid and bubbles can be seen at the output of the anode side.

   This may take several minutes.

9. As soon as the tube is full, press the *[OK]* key.

   ⇨ The next display appears:

SETUP 3/4	
Cathode filled?	
OK= Yes	ESC= End

   Simultaneously the cathode top-up valve FSB opens, so that softened water fills the cathode chamber of the membrane cell.

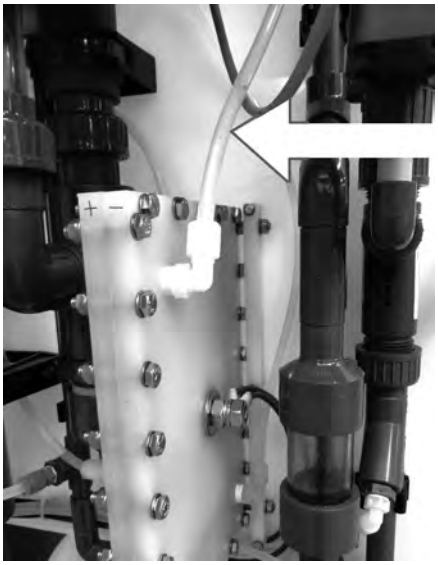


Fig. 21: Necessary liquid level on the cathode side

10. Now check that the tubes from and too the cathode side of the membrane cell have filled completely. Duration approximately 5 s.

    If fitted: The water level in the alkali storage tank must also be visible.

11. If fitted: Bleed the alkali pump and its suction hose, as for the brine pump.

12. As soon as these parts are full and bled, press the *[OK]* key.

    ⇨ The next display appears:

    SETUP 4/4

    Operational?
    OK= Yes ESC= End

    The cathode top-up valve FSB closes simultaneously.

13. If the system is considered as operational, press the *[OK]* key.

    ⇨ The following appears:

    USER S

    Press START

    The menu *'Setup'* is completed.

14. If the system is started after a long shutdown, the water softener must be manually regenerated - see chapter 10.

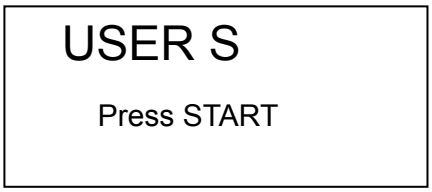
For the first system start-up, the water softener is regenerated in the factory.

The menu *'SETUP'* no longer needs to be run through.

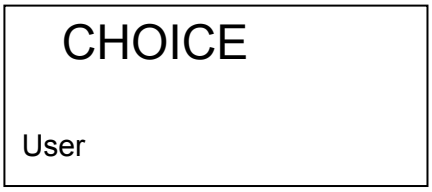
10.4 Run through the USER menu

To start up the control, run through the *'User'* menu.

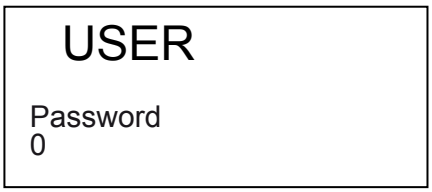
Prior to the start of the system, an operating mode must be selected. "Manual" operating mode with 0 % is preset.



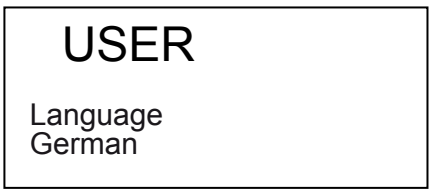
1. Press the *[S]* key.
   ⇨ The following appears:



2. Press the *[OK]* key.
   ⇨ The following appears:



3. Using the *[DOWN]* key set "999" and press the *[OK]* key.
4. Press the *[S]* key.
   ⇨ The following appears:



5. If necessary set the language using the *[arrow keys]* and press *[OK]*.
6. Press the *[S]* key.
   ⇨ Typically the following appears:

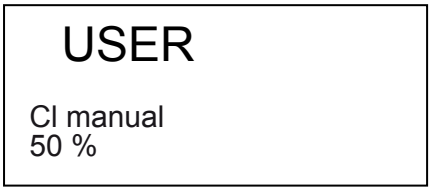
.

The composition in the *'User'* menu may depend on the ordered input signal. Therefore the options offered are explained below one after the other:

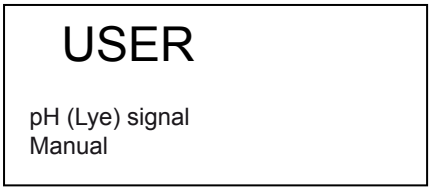
1 - Manual mode "M"
2 - On / Off "I"
3 - Pulse signal "F"
4 - Analog signal "A"
5 - Sensor "R"

10.4.1 Manual operating mode ("M")

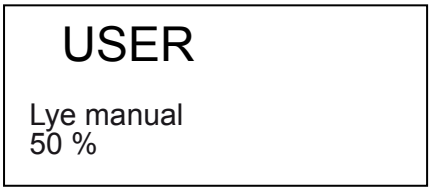
1. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:



   The display indicates the set chlorine production, relative to the maximum possible production.
2. Enter the desired value (*[arrow keys]*) and press the *[OK]* key.
3. Press the *[S]* key.
   ⇨ The following appears:



4. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:

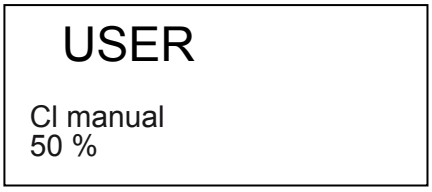


   The display indicates the set alkali production, relative to the maximum possible production.
5. Enter the desired value (*[arrow keys]*) and press the *[OK]* key.
6. Press the *[S]* key.

10.4.2 Operating mode On / Off ("I")

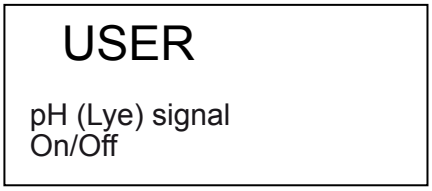
1. Press the *[S]* key.
   ⇨ The following appears:

2. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:

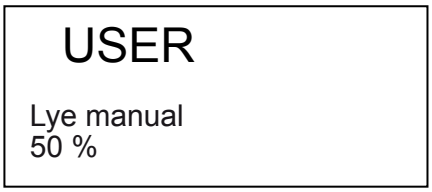


   The display indicates the maximum possible chlorine production.

3. Enter the desired value (*[arrow keys]*) and press the *[OK]* key.
4. Press the *[S]* key.
   ⇨ The following appears:



5. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:



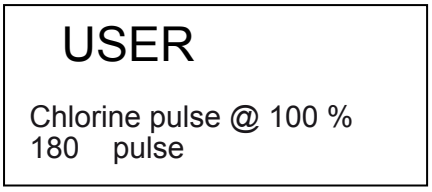
   The display indicates the maximum possible alkali production.

6. Enter the desired value (*[arrow keys]*) and press the *[OK]* key.
7. Press the *[S]* key.

10.4.3 Operating mode pulse signal ("F")

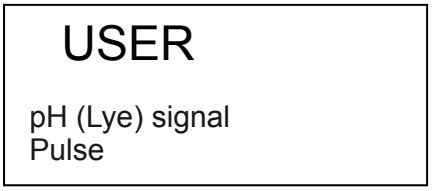
1. Press the *[S]* key.
   ⇨ The following appears:

2. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:

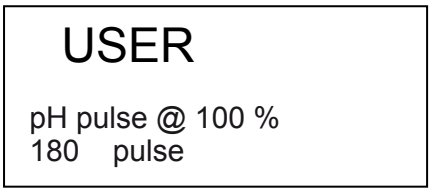


   The display indicates the pulse frequency for maximum chlorine demand.

3. Enter the desired value (*[arrow keys]*) and press the *[OK]* key.
4. Press the *[S]* key.
   ⇨ The following appears:



5. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:

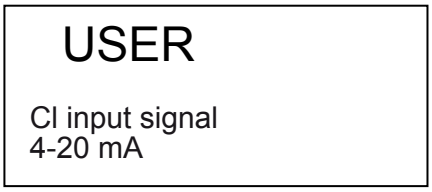


   The display indicates the pulse frequency for maximum alkali demand.

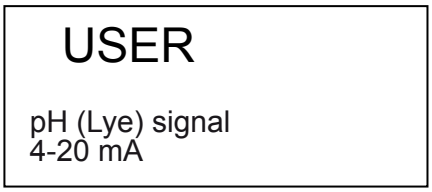
6. Enter the desired value (*[arrow keys]*) and press the *[OK]* key.
7. Press the *[S]* key.

10.4.4 Operating mode analog signal 4–20 mA ("A")

1. Press the *[S]* key.
   ⇨ The following appears:



   The display indicates the current range for chlorine demand.
2. Press the *[S]* key.
3. Press the *[OK]* key.
   ⇨ The following appears:



   The display indicates the current range for alkali demand.
4. Press the *[S]* key.

10.4.5 Operating mode sensor ("R")

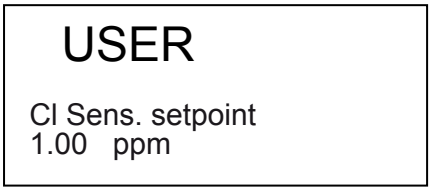
The "Sensor" selection is used for control with internal measurement. To do this an additional software add-on is necessary. If this is not available, "Sensor" can be selected, however the additional menus do not appear.

1. Press the *[S]* key.
   ⇨ The following appears:

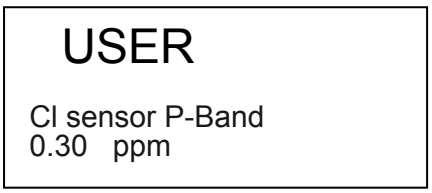
2. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:

3. Using the *[DOWN]* key select the measuring range of the sensor used and press the *[OK]* key.

4. Press the *[S]* key.
   ⇨ The following appears:



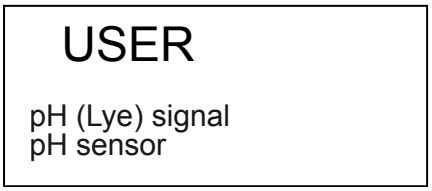
5. Adjust the desired setpoint for the chlorine control using the *[arrow keys]* and press the *[OK]* key.
6. Press the *[S]* key.
   ⇨ The following appears:



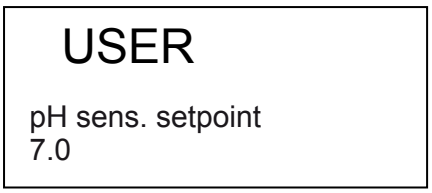
7. Adjust the desired P-band (Proportional band) for the set-point for the chlorine control using the *[arrow keys]* and press the *[OK]* key.

With a setpoint of 1.00 ppm and a P-band of 0.30 ppm, it follows that with a measured value of 0.70 ppm, the chlorine dosing is a maximum.

8. Press the *[S]* key.
   ⇨ The following appears:



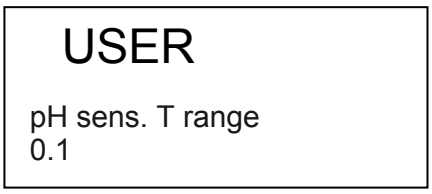
9. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:



10. Adjust the desired setpoint for pH control using the *[arrow keys]*.

11. Press the *[OK]* key and then the *[S]* key.

⇨ The following appears:

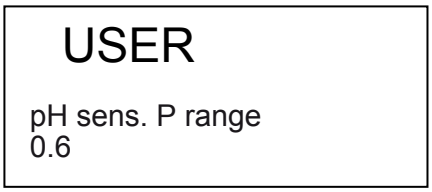


12. Adjust the desired T-band (dead zone, neutral range) for the setpoint for the chlorine control using the *[arrow keys]*.

With a setpoint of pH 7.0 and a T-band of 0.1 ppm, it follows that with a measured value between pH 6.9 and 7.1 no alkali will be dosed.

13. Press the *[OK]* key and then the *[S]* key.

⇨ The following appears:



14. Adjust the desired P-range (proportional band) for the pH control setpoint using the *[arrow keys]*.

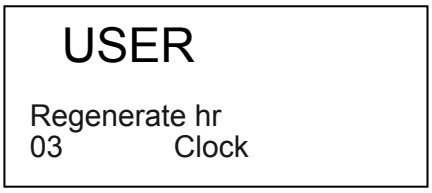
With a setpoint of pH 7.0 and a P-band of 0.6, it follows that with a measured value of pH 6.4, the alkali dosing is a maximum.

If fitted: Acid dosing is maximum at a measured value of pH 7.6.

15. Press the *[OK]* key and then the *[S]* key.

10.4.6 Other parameters

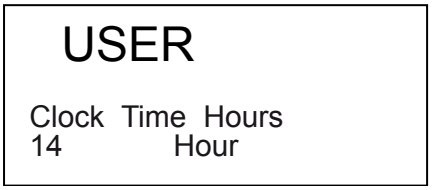
1. After the operating mode settings appears:



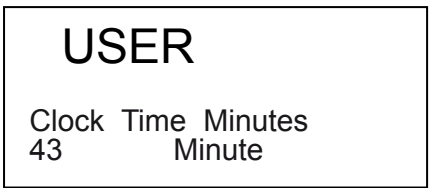
2. Using the *[arrow keys]* set the time at which the water softener is to be automatically regenerated.

03.00 a.m. is preset.

3. Press the *[OK]* key and then the *[S]* key.
   ⇨ The following appears:



4. Using the *[arrow keys]* set the hours of the current time and press the *[OK]* key.
5. Press the *[S]* key.
   ⇨ The following appears:

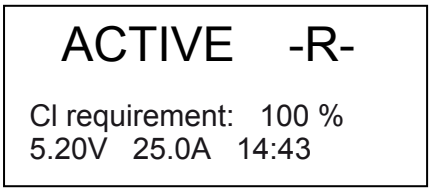


6. Using the *[arrow keys]* set the minutes of the current time and press the *[OK]* key.
7. Press the *[S]* key.

Summertime must be set manually.

10.5 Check the operating parameters

1. Press the *[START/STOP]* key.
   ⇨ The system is now working and the continuous display appears:



Control takes place using sensor = "R".

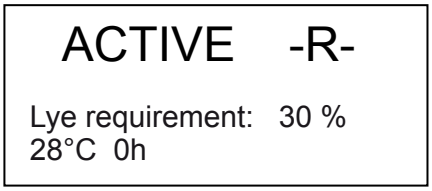
Chlorine demand is 100 %.

Voltage at the membrane cell is 5.20 V.

The current through the membrane cell is 25.0 A.

The time is 14:43.

2. Press the *[S]* key.
   ⇨ The continuous display appears:



   The alkali requirement is 30%.

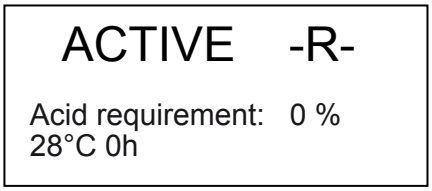
   The temperature in the control unit is 28 °C.

   The number of system operating hours is 0 h.

3. Without "Internal Measurement": the system is now in operation.

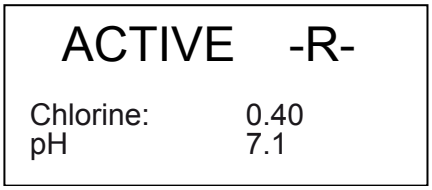
> *For the first start, it takes some 1 ... 2 hours until the system attains the normal operating parameters.*

4. With "Internal measurement" press the *[S]* key.
   ⇨ The continuous display appears:



   The acid requirement is 0 %.

5. Press the *[S]* key.
   ⇨ The continuous display appears.



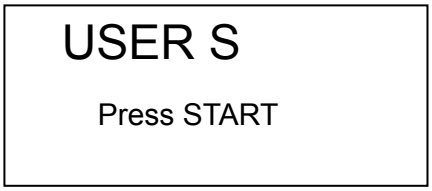
   The measured chlorine concentration is 0.40 ppm.

   The measured pH value is 7.1.

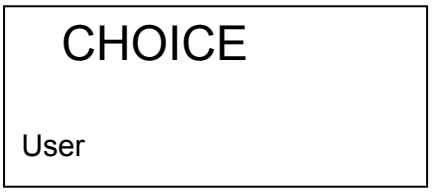
6. If fitted: Calibrate the chlorine and pH sensors.

10.6 Calibrate sensors

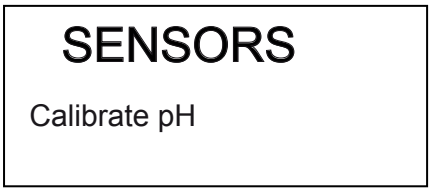
1. *[Start / Stop]* the system using the Start/Stop key.
   ⇨ The following appears:



2. Press the *[S]* key.
   ⇨ The following appears:

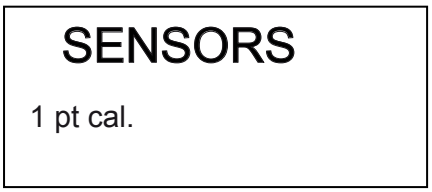


3. Use the *[DOWN]* key to change to the menu *'Sensor calib.'*.
4. Press the *[OK]* key.
   ⇨ The following appears:

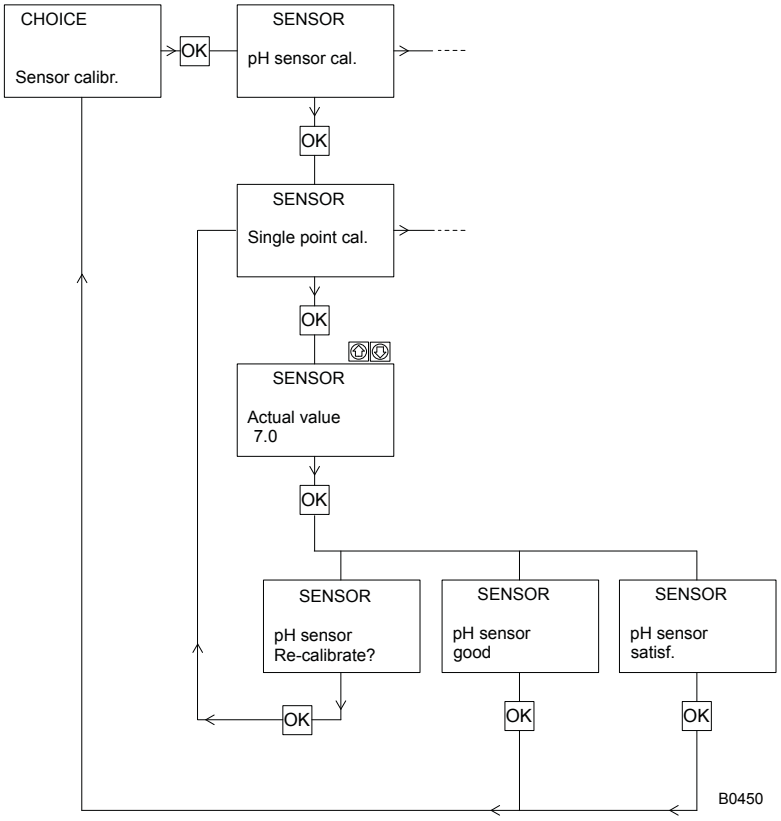


10.6.1 calibration pH

Press the *[OK]* key.
⇨ The following appears:



10.6.1.1 1 point calibration



1. Press the *[OK]* key.

   ⇨ The following appears:

   SENSORS

   Actual value
   10.0

2. Measure the pH value of the sample water.
3. Enter the pH value using the (*[arrow keys]*) and press the *[OK]* key.

   ⇨ The following appears:

   SENSORS

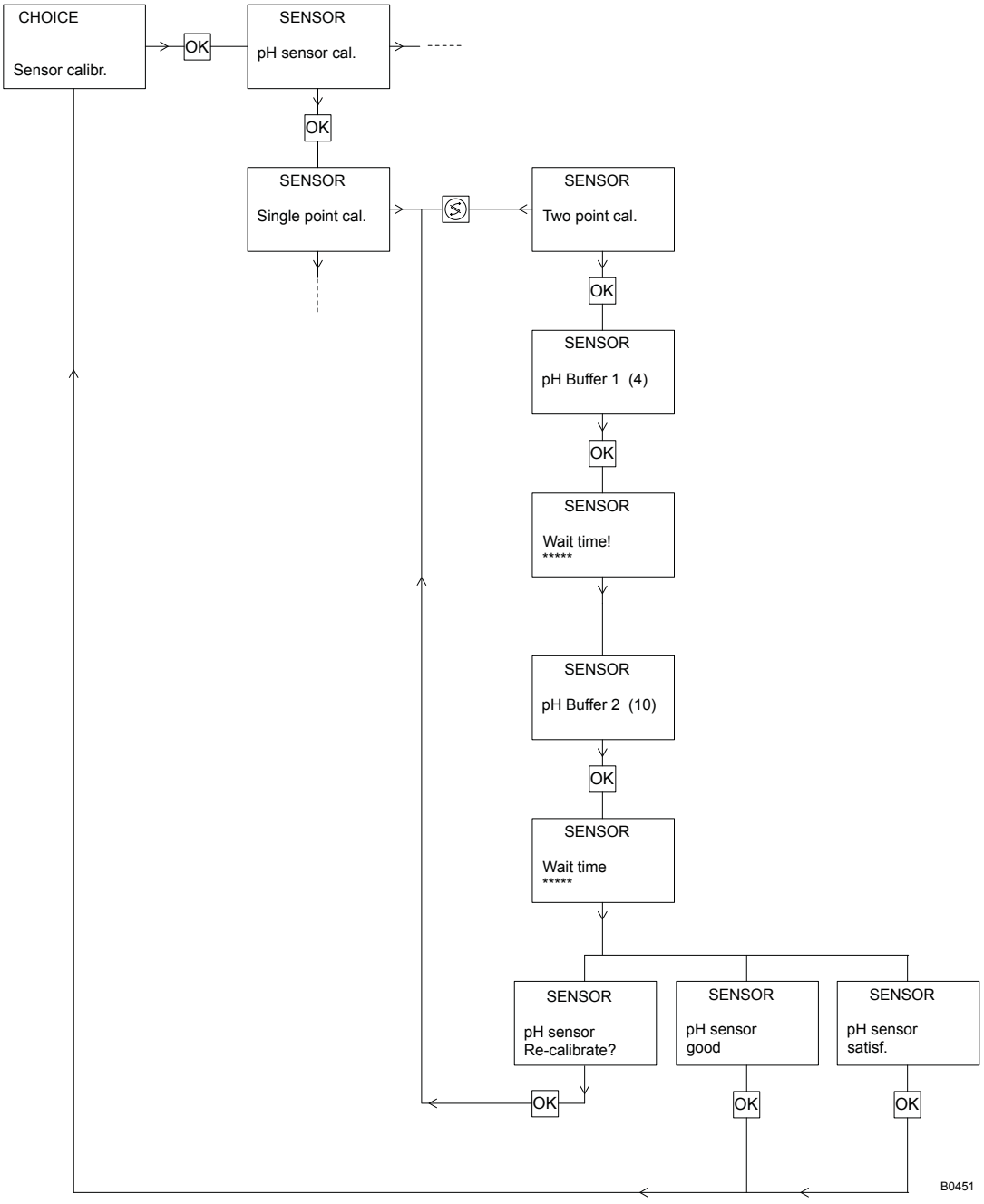
   pH calibrate
   Good

   The following table explains the messages.

4. If you do not want to *'Recalibrate?'* press the *[OK]* key and then *[ESC]*.
5. In all other cases, press the *[OK]* key.

Message	Cause	Remedy
'Good'	The sensor is OK.	-
'Satisfactory'	The sensor is still in the tolerance range.	Time to get a new sensor.
'Re-calibrate?'	The calibration is faulty. . The sensor is defective.	Repeat the calibration. Carry out a 2 point calibration. Procure a new sensor.

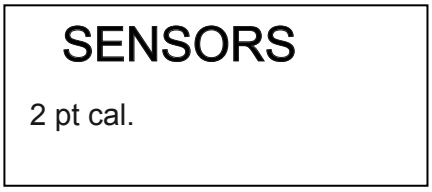
10.6.1.2 2 point calibration



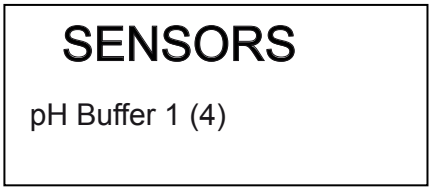
The 2-point calibration can be carried out if the 1-point calibration has failed. The 2-point calibration is always more precise and can also be carried out directly.

Materials required:

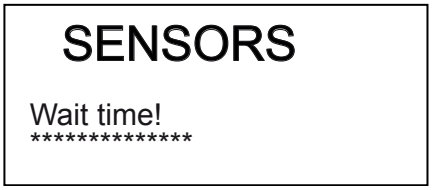
Quality buffer pH 4 and pH 10 (included in the scope of supply)



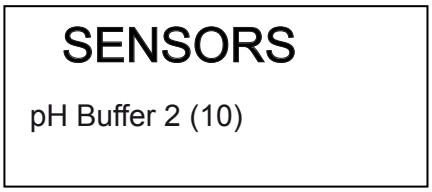
1. Press the *[S]* key to select a 2-point calibration.
2. Press the *[OK]* key.
   ⇨ The following appears:



3. Shut-off the sample water.
4. Unscrew the measuring transducer from the pH sensor.
5. Remove the pH sensor.
6. Rinse the pH sensor with distilled water.
7. Carefully dab the pH sensor dry with a cloth (grease-free, lint-free).
8. Screw the measuring transducer back onto the pH sensor.
9. Immerse the pH sensor in quality buffer 1 = pH 4, gently stir the buffer with it and press the *[OK]* key.
   ⇨ The following appears:

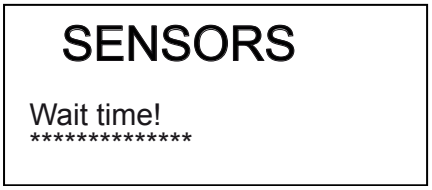


10. Hold the pH sensor in the quality buffer - without touching the wall, until this display appears:

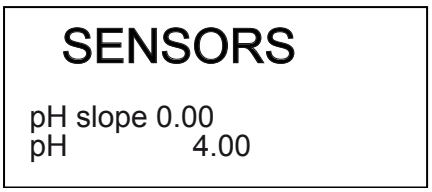


11. Rinse-off the pH sensor, carefully dab, immerse in the quality buffer 2 = pH 10, gently stir the buffer with it and press the *[OK]* key.

    ⇨ The following appears:



12. Hold the pH sensor in the quality buffer - without touching the wall, until this display appears:

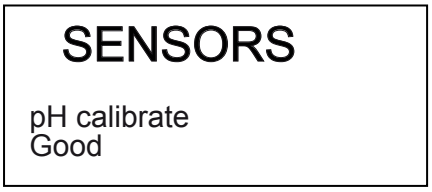


    ⇨ The display shows the slope and the zero point.

    (These values tell the expert something about the state of the sensor.)

13. Press the *[OK]* key.

    ⇨ The following appears:



    The following table explains the messages.

14. If you do not want to *'Recalibrate?'* press the *[OK]* key and then *[ESC]*.

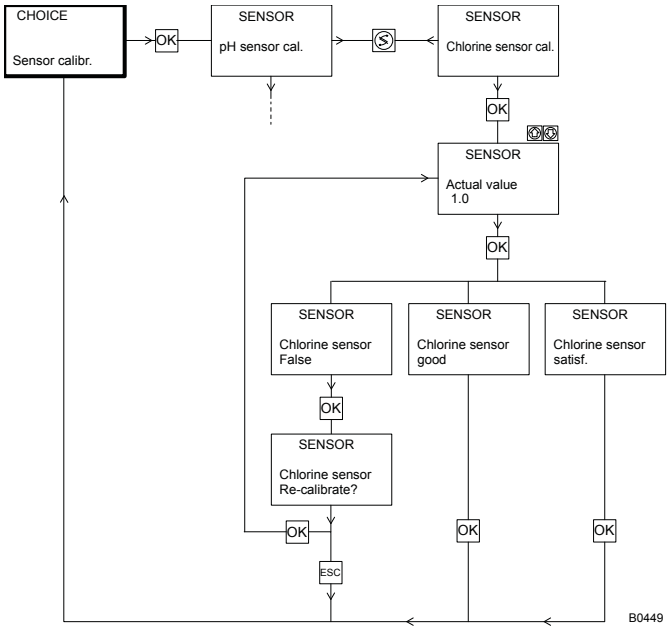
15. In all other cases, press the *[OK]* key.

16. Re-install the pH sensor.

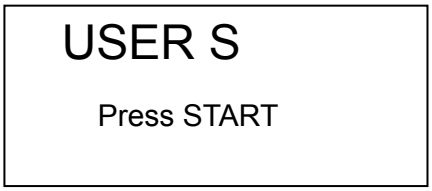
17. Re-open the stopcocks for the sample water, first discharge then feed.

Message	Cause	Remedy
'Good'	The sensor is OK.	-
'Satisfactory'	The sensor is still in the tolerance range.	Time to get a new sensor.
'Incorrect' and then *'Recalibrate?'*	The calibration is faulty. The sensor is defective.	Repeat the calibration. Procure a new sensor.

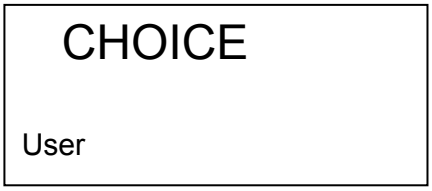
10.6.2 Chlorine calibration



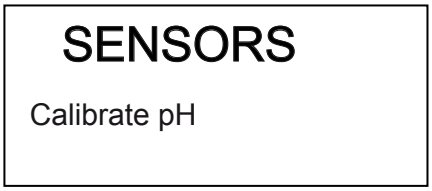
1. *[Start / Stop]* the system using the Start/Stop key.
   ⇨ The following appears:



2. Press the *[S]* key.
   ⇨ The following appears:



3. Use the *[DOWN]* key to change to the menu *'Sensor calib.'*.
4. Press the *[OK]* key.
   ⇨ The following appears:



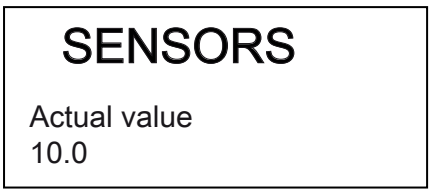
5. Press the *[S]* key.
   ⇨ The following appears:

The chlorine sensor calibration is always a 1-point calibration.

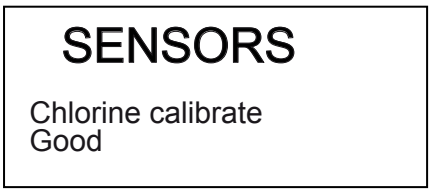
NOTICE!

- Please also observe the operating instructions for the chlorine sensor and the in-line probe housing.
- The slope has to be re-calibrated at regular intervals to ensure perfect operation of the chlorine sensor.
  Calibrating the sensor every 3-4 weeks suffices with swimming pool or potable water.
- Avoid incorrect dosing, which could be caused by air bubbles in the sample water! Air bubbles, which adhere to the membrane of the sensor, can result in too low a reading and thus lead to over-metering.
- Chlorine must be continuously present in the sample water (approx 0.5 mg/l) for the whole period.
  Otherwise the measuring system cannot calibrate.
- Please note the pertinent national guidelines for calibration intervals.

1. Take a water sample at the in-line probe housing.
2. Immediately afterwards, determine the chlorine content of the sample water with a photometer and a suitable measuring set, (e.g. DPD 1 for free chlorine (CLE sensor))
3. Press the *[OK]* key.
   ⇨ The following appears:



4. Enter the chlorine content using the (*[arrow keys]*) and press the *[OK]* key.
   ⇨ The following appears:



The following table explains the messages.

5. If you do not want to *'Recalibrate?'* press the *[ESC]* key.
6. In all other cases, press the *[OK]* key.

Message	Cause	Remedy
'Good'	The sensor is OK.	-
'Satisfactory'	The sensor is still in the tolerance range.	Time to get a new sensor.
'Re-calibrate?'	The calibration is faulty. The sensor is defective.	Repeat the calibration. Procure a new sensor.

10.7 Rinse water softener

As soon as the softener fills for the first time, green-brown water flows into the brine tank. If this is not desirable, rinse through the softener:

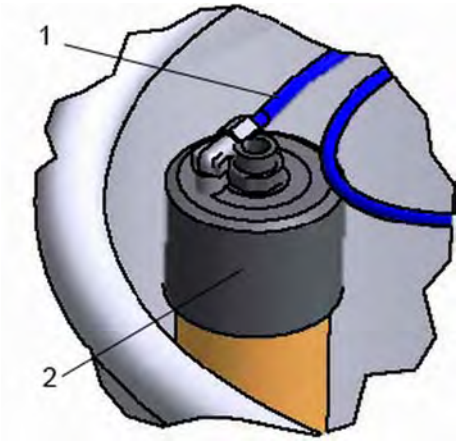


Fig. 22: The sampling unit in the brine tank

1. Release the blue hose (1) from the sampling unit and lead into a bucket.
2. Then pull the grey cap (2) off the sampling unit and pull the level switch out of the brine.
   ⇨ The system starts to fill, as soon as it is in the status *'Active'*.
3. Press the grey cap (2) back on to the sampling unit.
4. It may be necessary to repeat this step, until clear water comes out of the blue hose (1).
   ⇨ The softener is rinsed through.
5. Re-connect the hose (1) to its hose coupling.

11 During use

→ Inspect the system daily, see the "Maintenance" chapter.

CAUTION!

The membrane cell can be damaged irreparably.

Top up only with salt (NaCl) that conforms to the specifications - see chapter "Start up".

12 Maintenance

For optimum operation, the following measures must be observed:

WARNING!
For maintenance work always use suitable protective measures according to the supplier's manual.

CAUTION!
Important! Check the system to prevent serious damage. Each defect that is detected early-on can be easily rectified without endangering system reliability.

Only a trained service team may carry out annual and three-yearly maintenance.

Before working on the system, it must be rinsed through. Please refer to the "Adjustment" - "Rinse" chapter for instructions on rinsing the system so that it is free from chemicals.

Interval	Maintenance work
daily	Check the entire system for leaks, discolouration, unusual noises and error messages at the operating panel. Report any leaks immediately.
	Compare the chlorine value, which is displayed by the control and, if alkali dosing is available, the pH value with those of the tank water or, if available, the values at the in-line probe housing with the sensors.
	If necessary, add salt to the brine tank. Rule of thumb: It must be possible to see salt from the water.
	If the system stops working, check whether it is a normal control stop or if an external Enable condition exists *'Standby'*).
	If an unusual situation occurs, then after a short while check the system again. If the situation persists, inform the supplier.
Every 2 weeks	Check the softener, see *'Check the water softener' on page 63*.
Every 3 - 4 weeks	If fitted: Calibrate the chlorine sensor, see chapter "Start up" - "Sensor calibration". If fitted: Calibrate the pH sensor, see chapter "Start up" - "Sensor calibration".
Annually	Supplier maintenance in accordance with the maintenance manual. Standard maintenance kits can be obtained for this.
Every 3 years	Supplier maintenance in accordance with the maintenance manual. Standard maintenance kits can be obtained for this.

Check the water softener

CAUTION!

Severe damage at the membrane cell is possible

If the softener does not function correctly, limescale deposits may cause severe damage to the membrane cell.

– Also check the water hardness of the water from the softener.

1. To take a water sample from the softener proceed as for rinsing of the softener - see chapter "Start up" - "Rinsing the water softener".
2. Check that the water hardness of this water is 0 °dH.

To measure the water hardness, the measuring kit supplied by ProMaqua can be used - see "Ordering information" for the order no..

13 Troubleshooting

WARNING!
Chlorine, sodium hydroxide solution, hydrogen and sodium hypochlorite can be released from the system. Do not forget this!

WARNING!
The described activities must only be carried out the authorised personnel.

Errors without error messages

Fault description	Cause	Remedy
LCD screen is dark (no current)	Fuse defective	First check the fuse of the power supply and then if necessary the fuses in the control unit.
No chlorine present in the process water	Incorrect chlorine measurement	With external control: Check the sensors, calibration and control settings. With internal control: Calibrate the sensors
	Current value* at max. 5.2 V is low, although chlorine is requested	Check the supply of brine (is the brine tank full?). Bleed the brine pump
	Current value* at max. 5.2 V is low, although chlorine is requested	Check the solenoid valve "Top-up cathode" (SL). If it does not open correctly, no liquid can flow into the cell.
	Current value* at max. 5.2 V is low, although chlorine is requested	Check the water hardness. With hard water, the cell may have scaled up.
	No flow via the injector into the system	Check the input pressure and, if necessary, the booster pump
	Standby, no enable signal	Check the external enable contact

*** With 5 V electrode voltage, the current values are in the range:**

With Cl requirement of	25 g system	50 g system
approx. 25 %	6.1 A	12.5 A
approx. 50 %	12.5 A	25 A
approx. 100 %	25 A	50 A

Errors with error messages

Fault description	Cause	Remedy
'Not active'	No enable - the system is on standby	Check the external ENABLE contact.
'Brine level low'	Liquid level switch	Check the liquid level switch in the brine tank.

Fault description	Cause	Remedy
	Leaks	Check the hoses.
	Water pressure at the softener	Check the reducing valve and the softener.
'Error - no liquid flow'	Reed switch in the device	Check the reed switch for internal flow.
	Booster pump / circulation	Check the booster pump and the flow in the circulation line.
	With external measurement: Flow in the in-line probe housing	Check the flow in the in-line probe housing.
'Overtemperature' (PCB is too hot)	Room temperature	Check the room humidity.
	Fan	Check the fan in the control unit and, for type 50 only, the two fans at the cooling fins of the control unit.

Other error messages are described in the chapter "Adjustment" - "pH calibration" and "Chlorine calibration".

14 Decommissioning and disposal

1. If an alkali tank is fitted: Carefully empty the alkali tank via the alkali pump, turn the multifunctional switch to "Test".
2. Refer to the "Adjustment" - "Rinse" chapter for instructions on rinsing the system.
3. Remove the system plug the power socket.
4. Rinse the alkali away into the drain with two buckets of water.

During decommissioning and disposal of the system, observe the relevant, national disposal instructions.

15 Substances produced

Chlorine gas

Property	Unit	Value
ICSC / CAS		0126 / 7782-50-5
Risk phrases		R: 23-36/37/38-50
Safety phrases		S: 1/2-9-45-61
Boiling point	°C	-34
Flash point		Non-flammable
Temperature class		Not applicable
Density relative to air		2.47
Absolute density	kg/m³	3.18
Molar mass	g/mol	70.9
Vapour pressure	bar(a)	7
Colour		yellow-green

Hydrogen

Property	Unit	Value
ICSC / CAS		0001 / 133-74-0
Risk phrases		R: 12
Safety phrases		S: 2-9-16-33
Boiling point	°C	-253
Flash point		Flammable gas
Ignition temperature	°C	560
Temperature class		T1
Relative density relative to air		0.07
Absolute density	kg/m³	0.08908
Molar mass	g/mol	2
Explosive limits (LEL - UEL)	Vol.-% in air	4 ... 76
Colour		Colourless

Sodium hydroxide

Property	Unit	Value
ICSC / CAS		0360 / 1310-73-2
Risk phrases		R: 35
Safety phrases		S: 1/2-26-37/38-45
Concentration in CIV	%	10 ... 20

Property	Unit	Value
Concentration in CIV	g/l	100 ... 200
Boiling point (solution)	°C	110 ... 120
Flash point		Non-flammable
Temperature class		Not applicable
Density	kg/m³	1.2 ... 1.36
Molar mass	g/mol	40.0
Colour		Colourless

16 Technical data

Size	Type 25	Type 50
Output [g/h]	25	50
Mains voltage [VAC]	230± 5 %	230 ± 5 %
Mains frequency [Hz]	50	50
Power consumption [kW]	0.11	0.22
Control fuse protection [A]	6	6
Mains power lead fuse protection [A]	16	16
Salt consumption [g/h]	65	130
Process water pressure [bar]	1 ... 6	1 ... 6
Water consumption [l]	1.5	3
Dimensions LxBxH [mm]	590 x3 55 x 650	590 x 355 x 650
Volume brine tank [l]	120	120
Connector water circulation [Ø mm]	20	20
Connector sewage system [Ø mm]	20	20
Connector hydrogen exhaust duct [Ø mm]	20	20
Drainage quantity per regeneration		
Rinsing water [l]	25	25
Brine [l]	1	1
Drainage quantity at 100 % production		
Maximum alkali [l/h]	1.3	2.6
Hydrogen (l/h)	10	20

Electrical inputs

Input	Property
Contact (digital) inputs	potential-free
Analog inputs	active or passive

Electrical outputs

Output	Property
Status contacts	230 VAC / 2 A
Error contacts	230 VAC / 2 A

Ambient conditions

Data	Value	Unit
Ambient temperature, min.	+10	°C
Ambient temperature, max.	+35	°C
Maximum air humidity *	92	% rel. humidity

* non-condensing

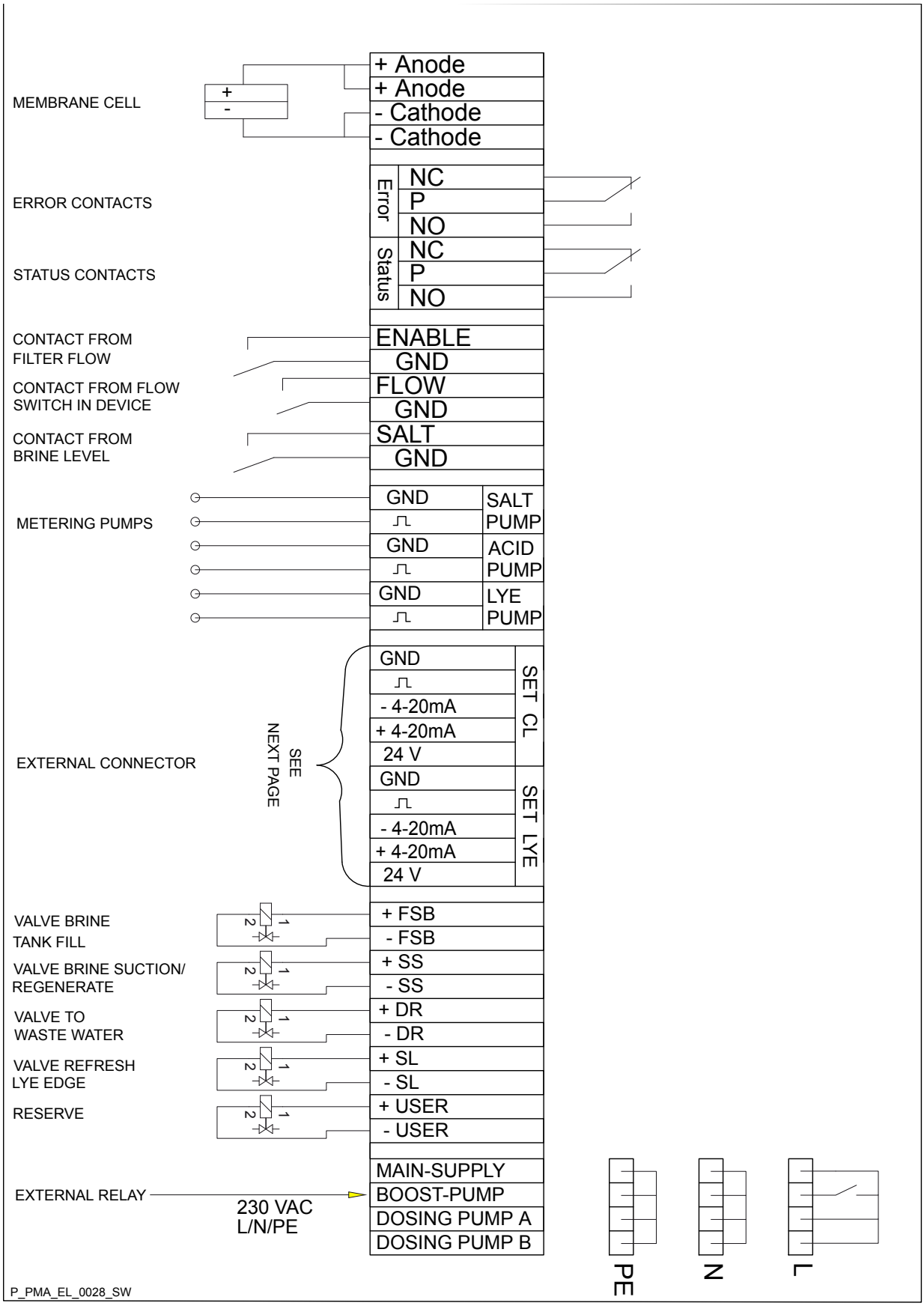
Miscellaneous: Protect against sunlight

Sound pressure level

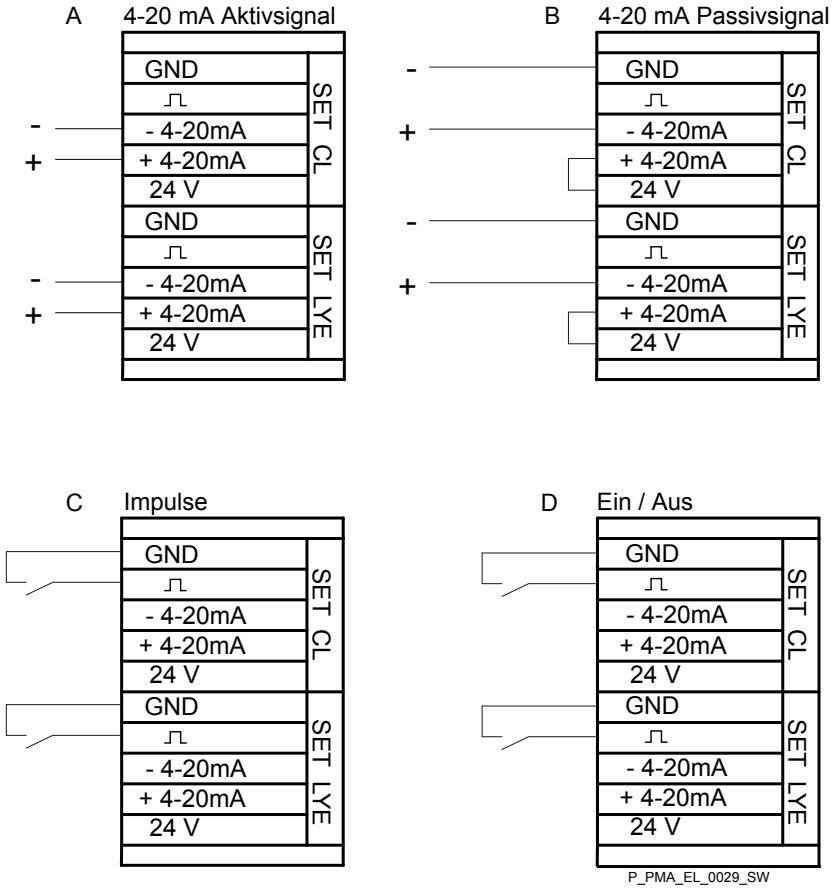
The sound pressure level is < 70 dB (A) at maximum power (without the booster pump)

17 Wiring diagrams

Wiring diagram system



External connector terminals



18 Ordering Information

pH quality buffer solutions

Buffer	Content [ml]	Part no.
Buffer pH 4.0, red colour	50	506251
	250	791436
Buffer pH 10.0, blue colour	50	506255
	250	791438

pH measuring instrument

	Part no.
Photometer Dulcotest DT1B	1039315

Water hardness measuring kit

	Part no.
Water hardness measuring kit	505505

19 Factory settings

Metering pumps

Parameter	For type 25:	For type 50:	Unit
Brine pump stroke length	100	100	%
Alkali (lye) pump stroke length	80	80	%

User menu

Parameter	For type 25:	For type 50:	Unit
Password	999 / ---	999 / ---	
Language	as ordered	as ordered	
Cl input signal	Manual *	Manual *	
Cl manual	0	0	%
Cl sensor range	0 ... 2	0 ... 2	ppm
Cl sensor setpoint	0.9	0.9	ppm
P-Band Cl sensor	0.3	0.3	ppm
Cl pulse @ 100%	180	180	1/min
pH (Lye) signal	Manual *	Manual *	
pH manual	0	0	%
pH sensor setpoint	7.2	7.2	
pH sensor T-band	0.1	0.1	
pH sensor P-band	0.5	0.5	
pH pulse @ 100%	180	180	1/min
Time of regener.	03:00	03:00	Time

* with integrated chlorine and pH controller Sensor

MFG menu

Parameter	For type 25:	For type 50:	Unit
Password	---	---	
Salt suction time	7	7	min
Softener rinse time	20	20	min
Anode pulse @ 100%	14	28	1/min
Lye pulse @ 100%	13	26	1/min
Acid pulse @ 100%	13	26	1/min
Cath. pulslength	420	520	ms
Cathode pulse @ 100%	130	180	1/h

Parameter	For type 25:	For type 50:	Unit
Brine tank filling time	6	6	min
Brine tank regenera-tion	5	5	min
Water hardness	25	25	°D

20 EC Declaration of Conformity

-Original-

CE- Declaration of Conformity IIA

We, **Van den Heuvel Watertechnologie bv**
Glashorst 114 **P.O. Box 71**
3925 BV Scherpenzeel (Gld) **3925 ZH Scherpenzeel (Gld)**
Netherlands **Netherlands**
Tel.: +31 (0)33 2778600
Fax :+31 (0)33 2778399
URL: www.vdhwater.nl
Email: info@vdhwater.nl

declare under sole responsibility that the product:

Chlorinsitu®-IV Compact,

Serial number:	**see Type plate on installation**

to which this declaration pertains, is in conformity with the provisions of the following directives:

Machinery Directive	**2006/42/EC**
EMC Directive	**2004/108/EC**
The part of the Low-voltage Directive is followed according appendix nr. 1.5.1 of the Machinery Directive 2006/42/EC	**2006/95/EC**
Explosion Protection Directive	**ATEX 95**

and with the associated international and national harmonized standards:

Electrical safety	**NEN 1010 and IEC/ EN 60204-1**
Risk assessment	**NEN 1050**
EMC	**IEC/ EN 61000-6.1- 6.2**
Classification of hazardous areas	**NPR 7910-1**

Technical Construction Dossier: Technical documentation collected and guarded at:	E. Brink Glashorst 114 3925 BV Scherpenzeel
Location and date:	Scherpenzeel, 08-05-2012
Signed by authorized representative:	E. Brink, Director

21 Index

1, 2, 3 ...

1 point calibration 54
2 point calibration 55
4-20 mA 48

A

About this product 6
Access codes 29
Acid pump 17
ACTIVE 29
Active carbon filter 13
Adjustment 28
ADJUSTMENT level 30
Alkali (lye) metering point 13
Alkali (lye) pump 12, 14
Alkali (lye) tank 13
Ambient conditions 7, 70
Analog signal 48
Analog signal "A" 16

B

Bleeding 13
Block diagram, changing the settings 28
Block diagram, operating menu 28
Booster pump 15, 17, 19, 20, 23
Brine pump 12, 14
Brine tank 14, 15, 26
Brine tank, installation 22
Buffer solutions 73
Bypass 20

C

Calibration, sensors 52
Calibration mA 32
calibration pH 53
Cell current 29, 51
Cell voltage 29, 51
Changing the settings, block diagram 28
Check the operating parameters 51
Check the water softener 63
Chlorine calibration 58
Chlorine concentration 29, 51
Chlorine gas 9
Choice 30
Choice menu, overview 31
Circulation line 20
Circulation water, inlet, outlet 13
Continuous displays 51
Controller with 4-20 mA output 24
Control unit 12
Control unit temperature PCB 29, 51
Control via a pulse output 23
Control via On/Off output 23
Current values, table 64

D

Device identification 5
Disposal 66
Disposal line 9
DR, valve 22
Drainage 9, 13, 15, 20
During use 61

E

Electrochemical process 14
Emergency 11
ENABLE 71
Enable, external 26
ENABLE terminal 26
ERROR 29, 64
Error contacts 71
Error messages 54, 55, 58, 64
Exhaust air 15
Explosion safety 10
External connector terminals 72
External controller, input 23
External enable 26

F

Factory settings 74
Fan cooling fins 12
Fan membrane cell 12
Fill brine tank 40
Filling time remaining 34
Filling time start 34
Filter insert 19
Float housing 13
FLOW 71
Flow, internal 13
Flow contact 25
FLOW terminal 25
Flow valve 19
FSB, valve 22
Functional description 14
Functions of the keys 32

G

General safety notes 9

H

Hydraulic circuit diagram 15
Hydrogen 9

Hydrogen exhaust duct..... 19, 20
I
INFO-level..... 29
Information in the event of an emergency..... 11
Injector..... 13, 14
Installation, electrical..... 22
Installation, hydraulic..... 19
Installation site..... 18
Integrated chlorine / pH controller..... 17
Integrated chlorine and pH controller..... 5
Intended use..... 8
K
Keys, functions..... 32
L
Layout drawing..... 19
Level switch..... 26
M
Maintenance..... 62
Manometer..... 13
Manual mode..... 45
Manual mode "M"..... 16
Manufacturer, menu..... 34
Membrane cell..... 13, 14
Menu manufacturer..... 34
Menu structure..... 31
Motor protection switch..... 23
N
Note for the system operator..... 10
O
On/Off..... 46
On / Off "I"..... 16
Operating hours..... 29, 51
Operating menu, schematic..... 28
Operating modes..... 16
Options..... 16
Ordering Information..... 73
Overview choice menu..... 31
P
Passwords..... 29
P-Band..... 48
Personal protective equipment..... 11
Personnel..... 8
pH..... 73
pH correction..... 5
pH correction (option)..... 17
pH measuring instrument..... 73
Photometer..... 73
pH value..... 29, 51
Process, electrochemical..... 14
Protective equipment..... 11
Pulse signal..... 47
Pulse signal "F"..... 16
Pulse solenoid valve SL..... 34
Pump bleeding..... 40
Q
Qualification of personnel..... 8
Quality buffer solutions..... 73
R
Reducing valve..... 13, 14
Reed switch..... 13, 25
Regenerate..... 37
Regeneration hour..... 50
Regeneration time..... 50
Remaining..... 37
Requirements applying to the organisation..... 11
Requirements applying to the starting substances..... 38
Requirements for the installation site..... 18, 66
Rinse..... 37
Rinse time salt..... 34
Rinse water softener..... 60
S
Safety chapter..... 8
Safety equipment..... 9
SALT..... 71
Salt, requirements..... 38
SALT terminal..... 26
Scope of supply..... 7
Sensor..... 48
Sensor "R"..... 16
Sensor installation, chlorine and pH..... 25
Settings - general approach..... 30
SETUP, menu..... 40
Setup menu..... 29
SL, valve..... 22
Sodium hydroxide..... 9
Solenoid switch..... 23
Solenoid valve FSB..... 34
Solenoid valve SL..... 34
Sound pressure level..... 11, 70
SS, valve..... 22
STANDBY..... 29
STARTUP..... 29
Start up..... 38
Status..... 29
Status contacts..... 71
Storage..... 7

Stroke rate pump..... 34
Substances produced..... 67
Suction time salt..... 34
Symbols..... 8
System function..... 14
T
T-Band..... 48
Technical data..... 69
Terminal box..... 12, 23
Test..... 37
Time..... 29, 50, 51
Transport..... 7
Troubleshooting..... 64
U
USER menu..... 44
USER S..... 30
V
Valve block..... 13, 22
W
Water, requirements..... 38
Water hardness..... 34, 38, 73
Water hardness measuring kit..... 73
Water pressure..... 40
Water softener unit..... 13, 14
Wiring diagrams..... 71